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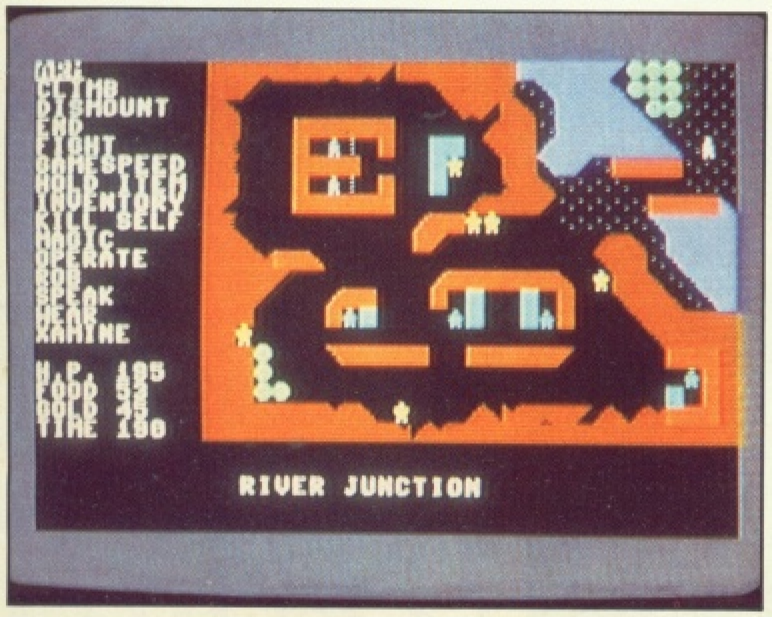

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Lighthearted Pleasures



Although this isn't really the time of year for masses of games releases there are still quite a few new titles around for you to choose from.

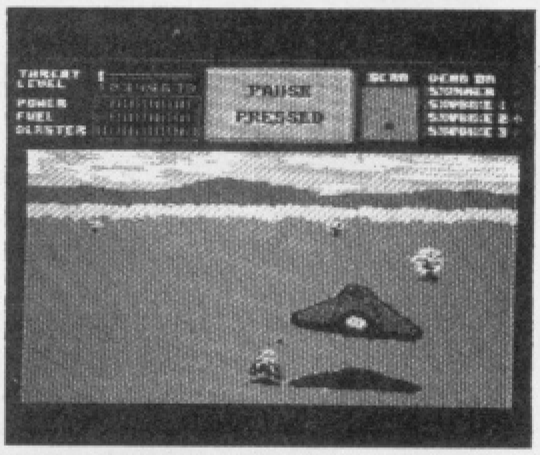
Sky Runner for the C64 from Cascade Software (£9.95 cassette, £12.95 disk) is a futuristic game which deals with drug wars. The drug is Sky which makes the population completely docile. Your job is to terminate the drug harvesting operation and thus free the populus from their soul destroying existence.

According to the authors the game was inspired by such movies as *Dune* and *Return of the Jedi* and is the culmination of several month's work. It was launched in the new year.

On a completely different historical level, *The Three Musketeers,* a new game from Swedish Software House, Computer Novels. The new game is available for the C64, C128 (with enhanced graphics) and the Amiga. Tape version is priced at £9.95, the 8-bit version on disk at £14.95 and there is even a 32-bit disk version at £24.95. The well known Three Musketeers story is the theme and the setting is 17th century France in turmoil. The game is built up around digitised pictures and contains six original music scores.

If you think that this all sounds a bit tame then maybe you'd rather have a go at Blood 'n Guts for the C64 (£9.95 tape and £14.95 disk). This is an ancient barabrian dacathlon game which features such imaginative events as ale drinking, human hitting and even cat throwing. Probably not recommended for the faint hearted.

Touchline:
Cascade Games: *Harrogate, N Yorks.* ***Tel:*** *0423 525325.* ***American Action and Computer Novels:*** *Box 10090, S-200 43 Malmo, Sweden.* ***Tel:*** *(+46) 40 23 25 20.*



Sport Simulations

New from US Gold is a 10 pin bowling simulation entitled *10th Frame.* The game is by the authors of *Leaderboard* and aims to recreate the fun on 10 pin bowling for all the family.

Select league play and you can take the option of playing in teams of up to four people, or open bowling will allow up to eight individual players.

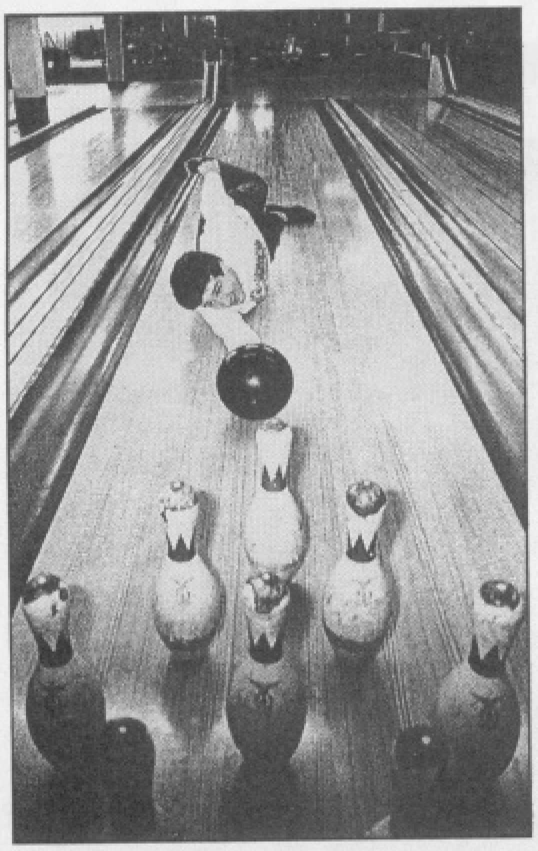
Features include scoreboard printout, automatic scoring, power and hook control, outstanding sound and pin action several different skill levels.

It's available for the C64 and will be released shortly on the Amiga.

On a totally different level,



DATA STATEMENTS



Cap:

Konami is releasing *WEC Le Mans 24*, a fast racing car simulation. Look out for more details.

Touchline:

US Gold:** Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel: *021 356 3388.* ***Konami:*** *Nemesis, Bank Buildlings, Bank Street, Newton Abbot, Devon TQ12 2JL.*

Pet Revival

Owners of PET computers have responded enthusiastically to the news that Supersoft is spearheading a revival of this once popular Commodore machine.



Cap:

Supersoft bought up Commodore's last remaining stocks of the PET range in 1986. Since then enquiries from existing users have been flooding in.

However most of the stocks purchased were the older 4032 and 8032 computers and many users who enquired were hoping to expand their systems with the 8296 computers, the last produced in the PET range.

Supersoft has now managed to locate stores of brand new 8296 computers in a Commodore warehouse in Europe. These have now been imoported and are available from Supersoft at a price of £595 plus VAT.

Hewson Future

Hot on the heels of the new year, Hewson is releasing a new C64 title. Named *Ranarama*, it's due out at the end of March and is a multi-level game combining strategy and basic shoot 'em up in order to appeal to all games fans.

The game is set in a labyrinth of rooms viewed from above. Intrigue and suspense is added since the rooms only become visible upon being entered.

You control Mervyn a sorceror's apprentice who has evaded the evil warlocks by turning himself into a frog whilst trying to concoct a body-building potion. You must combat 12 guarded wizards on each of eight levels to obtain missiles power and shields.

Ranarama was written by Steve Turner, a regular Hewson programs who has written several very popular games including *Dragontorc, Avalon, Astro Clone* and more recently, *Quasatron.*

Touchline:

Hewson:** 56b Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX.* ***Tel: *0235 832939.*

Welsh Winners

Knoix, the company which produced the *Speed King* Joystick, has been awarded the New Enterprise Award in the Welsh National Business Awards 1986.

The award was presented to the managing director of Konix, Wyn Holloway (left of picture), by Sir John Harvey-Jones the chairman of ICI and was won just over 18 months after the company was formed.

Konix was the only company to reach three finals, the Design Technology Award, the New Enterprise Award and the Business Achievement of the year. Competing companies included Laura Ashley and Biritsh Aerospace.

Touchline:

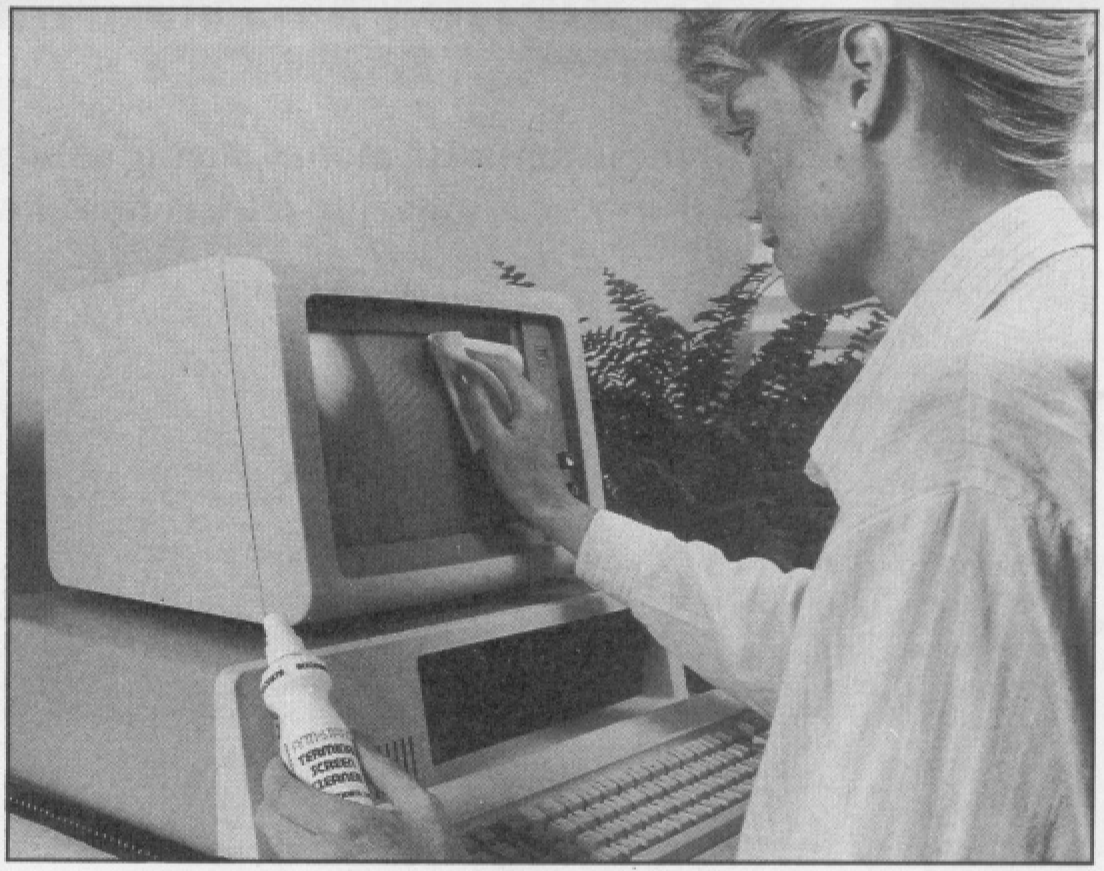
Konix:** Unit 13, Sirhowy Hill Industrial Estate, Tredegar, Gwent NP2 4QZ.* ***Tel: *049525 5913.*



Cap:

DATA STATEMENTS

Care of Your Computer



Accodata has updated and extended its range of cleaning material for computers.

New products include kits for 3½ inch disk drive heads, ¼ inch data cartridge heads, keyboards and casing and printers and typewriters. Kits are designed to clean away dust and grime as well as old ink from ribbons on golfballs and daisy wheels.

Also from Accodata is a three product range made up of a surge protector, a two way power filter and a four way power filter.

Power line disturbances, known as spikes and surges can damage sensitive equipment, wipe clean a computer's memory and produce garbled data.

Prices are £62.16 for the two way filter, £84 for the four way filter and £12.96 for the surge protector plug.

Touchline:

Accodate: 36 Corydon Road, Beckenham, Kent BR3 4BH. ***Tel:*** *01 650 4818.*

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Sport on Channel 64

Sport games have been an immensely popular area of software ever since the first crude ping pong. Here's a round up of the best simulations.

By Tony Hetherington

If you're fed up with watching Liverpool playing every weekend. Steve Davis winning another match or yet another contest between Cram, Coe and Ovett then why not tune into Channel 64. We've got over 40 sporting challenges ranging from world football to America's cup racing.

Multiple Events

Activision released *Decathlon* in 1983 which was quickly followed by Ocean's *Daley Thomspon's Decathlon.* The race to the Olympics was on. Both featured the 10 gruelling events that form the Olympic Decathlon. *Decathlon* was the more accurate simulation as each competitor frantically waggled his joystick in all 10 events where as Ocean's game demanded success in one event before you could compete in the next.

Now joystick athletes can tackle the sprints and hurdles of *Summer Games* (seven events), high jump, equestrian and canoeing of Summer Games II (another seven events), the superb bobsled, ski jump, hot dog ariel, skating and biathlon of *Winter Games* (six excellent events), the round the world tour of logging rolling, barrel jumping, weight lifting and sumo wrestling of *World Games* (eight events) and the budget priced sprinting, archery and diving of *Go for Gold* (seven events). All of these are from US Gold.

Soccer

Football fans had a field day last year with the World Cup in Mexico and we feature five football games. The first was the literally basic conversion of the Spectrum hit *Football Manager* by Addictive Games that has been recently re-released. Unfortunately, C64 owners expected more of a game than their rubber keyed cousins and it failed to score.

The best C64 football game is still Commodore's own *International Soccer*. Its simple gameplay let's you control the action against either human or nine computer opponents. The system is simple as you control the man that is nearest to the ball with the computer controlling all the "off the ball running".

World Cup Carnival caused the greatest uproar from the crowd when it was released in time to capitalise on the World cup fever. Promising a badge, poster and a game that took six months to develop. However on release the game looked too familiar and turned out to be a slightly revamped version of Artic's *World Cup II*! This earned US Gold a yellow card and boosted sales of *Now Games 2* that also carried Artic's game.

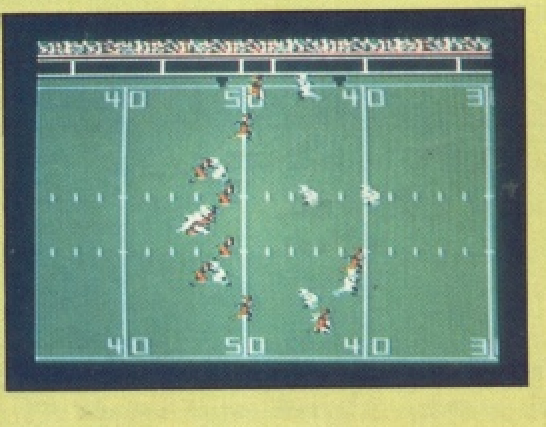
After the World Cup the papers were dominated by the incident when Diego Maradona punched the ball past Peter Shilton to knock England and out of the cup. Now that moment has been immortalised in Grandslam's (Argus) *Peter Shilton's Handball Maradona* game. However, the game itself is dull and uninspiring although it does contain the classic phrase "a game of two halves" in its instructions.

Gremlins new *Footballer of the Year* shows more promise as you battle your way through poverty, low divisions and defences in your struggle to become the best footballer of the year. The game plays a computerised board game with goal attempts coming from bought goal cards and transfers, pools wins and business profits from chance "incident" cards. Despite a few annoying bugs such as league goals being counted twice in your tally the game is ridiculously addictive.

American Football

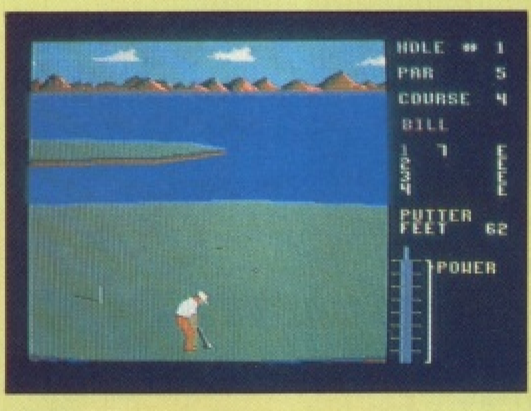
Football fans who enjoy the game American style can re-create the 1986 Super Bowl when the Bears destroyed the patriots in Ocean's *Super Bowl* as well as play individual games in Bug Bytes budget *American Football*, Ariolasoft's *Touchdown Football* and *The Nexus Super Bowl Sunday*. You can also recreate the entire season in the gridiron version of Addictive's Football Manager, *Headcoach.*













My pick of the bunch is Super Bowl Sunday that presents some complex accurate statistics in a highly playable form for a selection of football's greatest teams. Now you can be crunched by Chicago's 86 defence, throw touchdown passes with Dan Marino and the 82 Miami Dolphins and watch as John Riggens rips through defences to lead the Redskins to victory.

Baseball

US Football's American brother baseball is also well represented as digital pitchers and hitters can argue over the strikes, balls, base hits and home runs in *Hardball* (US Gold/Accolade), *World Series Baseball* (Imagine) and Activision's *Star League Baseball.*

Accolade's debut game, *Hardball*, is the leader both in graphics and gameplay giving novice and expert a run for their money. Simple joystick moves select from the available sinkers, fastballs, curveballs, sliders and changeups that the hitter must bat over the fence for a home run. Nine innings of non-stop action.

Golf

Golf has never been my favourite sport and has always prompted me to swap channels but Channel 64 has two hardhitting heroes; Ariolasoft's simulation, *Golf Construction Set* and the "hit and see" action of US Gold's (Access) *Leader Board.*

The *GCS* golfer selects his clubs and then battles against his own handicap on one of four accurately simulated courses represented on screen both as a plan to choose your shot and a 3D view of the action.

There is nothing realistic about the *Leader Board* courses as they consist of a series of islands surrounded by ball chomping lakes. Both games are fun to play and better than the sport they represent. *GCS* is the more accurate game and suitable for a lengthy campaign to reduce your handicap from beginner (28) down to pro (0). *Leader Board* fans that drove the game to the top of the charts can replay all their best shots as US Gold releases four more courses in its *Leader Board Tournament* expansion set.

There are other golf games such as Mastertronic's budget *Hole in One* and the Argus *Nick Faldo Plays the Open* but *Leader Board* and *GCS* are the clear leaders.

Cricket

Two famous names battled it out for the cricket honours as *Graham Gooch's Test Cricket* (Audiogenic) took on Tynesoft's *Ian Botham.*

I found Botham's to be the better game once you'd played yourself in but poor graphics let the appalling Gooch cricket take the honours. The graphics are quite impressive but soon lose their appeal as you realise they are just a series of set patterns that interrupt the action. The game itself is dreadful and can be played in both arcade and simulation modes. The simulation mode is the game you can actually play and win while you're asleep! How well you do in the arcade version depends solely on the skill level. Choose the highest and you'll be all out in two overs but at the lowest you can score fours and sixes off your bat, leg and nose!

And the others

For a change from the "popular" sports why not try wrestling in Melbourne House's *Rock 'N' Wrestle* that features 25 bone crushing moves in another game that outclasses it's sport. The same is also true of Activision's *Two on Two Basketball* that adds excitement to a dreary sport or *Bump, Set and Spike* your way through a volleyball match courtesy of Mastertronic or punch your opponent into a pulp in *Frank Bruno's Boxing* (Elite – now available as part of Hitpack), *Barry McGuigan's World Championship Boxing* (Activitision) and US Gold's *Fight Night* in the pick of the pugilists.

Whatever your sport you're sure to find a game to recreate your favourite heroics even yachting (*America's Cup* – US Gold), table tennis (*Superstar Ping Pong* – US Gold) and *Ice Hockey (*from Anco).

Touchline

Activision: 23 Pond Street, London NW3 2PN. ***Tel:*** *01 431 1101.*
Ocean, Imagine: *6 Central Street, Manchester M2 5NS.* ***Tel:*** *061 832 6633.*
US Gold: *Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.*
Addictive Games: *10 Albert Road, Bournemouth BH1 1BZ.* ***Tel:*** *0202 296404.*
Commodore: *Hunters Road, Weldon, Corby, Northants NN17 1QX.* ***Tel:*** *0536 205555.*
Argus: Grandslam, Bug Byte: *Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01 439 0666.*
Gremlin: *Alpha House, 10 Carver Street, Sheffield S1 4FS.* ***Tel:*** *0742 753523.*
Ariolasoft: *68 Long Acre, London WC2E 9JH.* ***Tel:*** *01 836 3411.*
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Anco: *35 West Hill, Dartford, Kent DA1 1EL.* ***Tel:*** *0322 92513.*

Spelling Checker

An ingenious program to help you provide yourself with a personalised dictionary to avoid those embarrassing mistakes.

By W.I. Sellers

Proof reading a word-processed document is probably not most people's idea of an enjoyable way of spending an hour or so. Thus, any device that can make this job even a little easier is to be welcomed.

A spelling checker helps by comparing every word in the document with a list of common words, and indicating any that it does not find. This is obviously not infallible since the mistyping of a word can produce another word that will be recognized by the spelling checker and so the mistake will not be spotted. Also, it is not possible for the machine to know every word, therefore uncommon words will always be indicated as misspelled.

Normally, this is not the sort of program that can be typed in from a listing in a magazine since the on-line dictionary will contain several thousand words. However, this program is self teaching and can quickly obtain words for its list from documents it is used to check. This is achieved by allowing the user to ask the computer to remember correctly spelled words that it does not yet know. In this way, the computer gets its word list without the user needing to type in any extra words at all.

In Use

The program shown is for use with a disk drive and running it causes a machine code program called 'SPELL-CHECK' to be created. To run the program, type LOAD"SPELL-CHECK",8,1 and then RUN it. The following menu will appear:

(1) Spelling check
(2) Options
(3) Load Dictionary
(4) Save Dictionary
(5) Delete Word
(6) Directory

SPELLING CHECK prompts for a filename and proceeds to perform a spelling check on that file. OPTIONS allows the user to set up spelling check parameters. Thus, the option to add words to the dictionary can be selected; whether or not a printout of the misspelt words is required; and whether the file is Plus/4 built in word processor format or standard ASCII. The LOAD and SAVE DICTIONARY options are for (believe it or not) loading and saving dictionary files. DELETE WORD allows the user to delete an unwanted word from the dictionary – a misspelling that has got in by mistake perhaps. Directory prints out the disk directory.

On first running the spelling checker, the dictionary is empty and so it is necessary to type '2' to get to the OPTIONS menu. Typing the relevant letter will toggle the parameter: thus pressing 'C' will switch the program to add word mode. Then type 'D' to exit back to the main menu and then press '1' to initiate the spelling checker. This prompts for the name of the file to be checked.

When a word is not found, you are asked whether or not it is to be added to the dictionary. Going through a few lengthy files, getting the computer to add any not too esoteric words to its dictionary will rapidly generate a sizeable list of words that can now be saved as a dictionary file. This can be added each time a file is spelling checked until the limit set by the memory size of the Plus/4 – about 58K bytes or around 7000 words. If these words have been fairly carefully selected, then most words that the checker fails to recognise will indeed be errors.

PROGRAM: CHECKER CREATOR

```
10 OPEN8,8,8,"SPELLCHECK,P,W"
20 PRINT#8,CHR$(1);CHR$(16);
30 D=4097:L=140
40 T=0
50 FORX=1TO8
60 READA:IFA=-1THEN110
70 PRINT#8,CHR$(A);:D=D+1:T=T
+A
80 NEXT
90 READA:IFA=-1THEN110:ELSEIF
T<>ATHENPRINT"ERROR IN LINE "
;L:GOTO120
100 L=L+10:GOTO40
110 IFD<>5858+1THENPRINT"ADDR
ESS ERROR":GOTO120
120 CLOSE8
130 END
140 DATA11,16,10,0,158,52,49,
48,344
150 DATA57,0,0,0,169,0,141,21
,388
160 DATA255,141,25,255,162,91
,160,16,1105
170 DATA32,105,22,32,228,255,
201,49,924
180 DATA208,6,32,239,19,76,21
,16,617
190 DATA201,50,208,6,32,106,1
```

```
7,76,696
200 DATA21,16,201,51,208,6,32
,132,667
210 DATA19,76,21,16,201,52,20
8,6,599
220 DATA32,118,18,76,21,16,20
1,53,535
230 DATA208,6,32,246,18,76,21
,16,623
240 DATA201,54,208,199,32,52,
17,76,839
250 DATA21,16,158,147,13,13,1
3,32,413
260 DATA32,32,32,32,32,32,32,
32,256
270 DATA32,77,69,78,85,58,13,
13,425
280 DATA13,32,32,32,32,32,32,
32,237
290 DATA32,32,32,40,49,41,32,
83,341
300 DATA80,69,76,76,73,78,71,
32,555
310 DATA67,72,69,67,75,13,13,
32,408
320 DATA32,32,32,32,32,32,32,
32,256
330 DATA32,40,50,41,32,79,80,
84,438
340 DATA73,79,78,83,13,13,32,
32,403
350 DATA32,32,32,32,32,32,32,
32,256
360 DATA40,51,41,32,76,79,65,
68,452
370 DATA32,68,73,67,84,73,79,
78,554
380 DATA65,82,89,13,13,32,32,
32,358
390 DATA32,32,32,32,32,32,32,
40,264
400 DATA52,41,32,83,65,86,69,
32,460
410 DATA68,73,67,84,73,79,78,
65,587
420 DATA82,89,13,13,32,32,32,
32,325
430 DATA32,32,32,32,32,32,40,
53,285
440 DATA41,32,68,69,76,69,84,
69,508
450 DATA32,87,79,82,68,13,13,
32,406
460 DATA32,32,32,32,32,32,32,
32,256
470 DATA32,40,54,41,32,68,73,
82,422
480 DATA69,67,84,79,82,89,13,
13,496
490 DATA13,32,32,32,32,32,32,
32,237
500 DATA32,32,32,83,69,76,69,
67,460
510 DATA84,32,70,85,78,67,84,
73,573
520 DATA79,78,0,169,147,32,21
0,255,970
530 DATA32,188,200,32,64,17,9
6,162,791
540 DATA79,160,17,32,105,22,3
2,228,675
550 DATA255,201,32,208,249,96
,13,13,1067
560 DATA80,82,69,83,83,32,83,
80,592
570 DATA65,67,69,32,84,79,32,
67,495
580 DATA79,78,84,73,78,85,69,
13,559
590 DATA0,162,208,160,17,32,1
05,22,706
600 DATA162,96,160,22,32,84,1
8,162,736
610 DATA237,160,17,32,105,22,
162,95,830
620 DATA160,22,32,84,18,162,8
,160,646
630 DATA18,32,105,22,162,94,1
60,22,615
640 DATA32,84,18,162,35,160,1
8,32,541
650 DATA105,22,32,228,255,201
,65,208,1116
660 DATA11,173,96,22,73,1,141
,96,613
670 DATA22,76,106,17,201,66,2
08,11,707
680 DATA173,95,22,73,1,141,95
,22,622
690 DATA76,106,17,201,67,208,
11,173,859
700 DATA94,22,73,1,141,94,22,
76,523
710 DATA106,17,201,68,208,204
,96,147,1047
720 DATA13,13,13,32,32,32,32,
32,199
730 DATA32,32,32,32,32,40,65,
41,306
740 DATA32,80,82,73,78,84,69,
82,580
750 DATA32,32,32,0,13,13,32,3
2,186
760 DATA32,32,32,32,32,32,32,
32,256
770 DATA40,66,41,32,65,83,67,
73,467
780 DATA73,32,32,32,32,32,0,1
3,246
790 DATA13,32,32,32,32,32,32,
32,237
800 DATA32,32,32,40,67,41,32,
65,341
810 DATA68,68,32,87,79,82,68,
32,516
820 DATA32,0,13,13,32,32,32,3
2,186
830 DATA32,32,32,32,32,32,40,
68,300
840 DATA41,32,69,88,73,84,13,
13,413
850 DATA13,13,13,32,32,32,32,
32,199
860 DATA32,32,32,32,32,83,69,
76,388
870 DATA69,67,84,32,79,80,84,
73,568
880 DATA79,78,0,134,5,132,6,1
60,594
890 DATA0,177,5,208,8,162,114
,160,834
900 DATA18,32,105,22,96,162,1
10,160,705
910 DATA18,32,105,22,96,79,78
,32,462
920 DATA0,79,70,70,0,162,228,
160,769
930 DATA18,32,105,22,32,94,19
,160,482
940 DATA0,185,224,18,157,51,3
,200,838
950 DATA232,192,4,208,244,138
,162,51,1231
960 DATA160,3,32,189,255,169,
8,170,986
970 DATA168,32,186,255,32,192
,255,32,1152
980 DATA183,255,201,0,208,207
,162,8,1224
990 DATA32,201,255,169,146,13
3,3,169,1108
1000 DATA22,133,4,160,0,120,1
41,63,643
1010 DATA255,177,3,141,62,255
,88,32,1013
1020 DATA210,255,230,3,208,2,
230,4,1142
1030 DATA165,4,205,199,22,208
,230,165,1198
1040 DATA3,205,198,22,208,223
,169,8,1036
1050 DATA32,195,255,32,204,25
5,96,44,1113
1060 DATA83,44,87,147,83,65,8
6,69,664
1070 DATA32,68,73,82,69,67,84
,79,554
1080 DATA82,89,13,13,0,169,1,
141,508
1090 DATA97,22,162,18,160,19,
32,105,615
1100 DATA22,32,101,19,224,0,2
40,237,875
1110 DATA32,161,20,169,0,141,
97,22,642
1120 DATA96,147,87,79,82,68,3
2,63,654
1130 DATA0,238,100,22,172,100
,22,177,831
1140 DATA3,160,0,145,3,230,3,
208,752
1150 DATA2,230,4,165,4,205,19
9,22,831
1160 DATA208,234,165,3,205,19
8,22,208,1243
1170 DATA227,174,99,22,232,23
2,224,54,1264
1180 DATA240,22,189,146,22,56
,237,100,1012
1190 DATA22,157,146,22,232,18
9,146,22,936
1200 DATA233,0,157,146,22,76,
62,19,715
1210 DATA141,62,255,88,96,162
,121,160,1085
1220 DATA19,32,105,22,162,0,3
2,207,579
1230 DATA255,157,51,3,232,201
,13,208,1120
1240 DATA245,202,169,13,32,21
0,255,96,1222
1250 DATA70,73,76,69,78,65,77
,69,577
```

```
1260 DATA32,63,0,162,192,160,
19,32,660
1270 DATA105,22,32,210,19,162
,8,32,590
1280 DATA198,255,169,146,133,
3,169,22,1095
1290 DATA133,4,160,0,32,130,2
0,192,671
1300 DATA0,208,19,120,141,63,
255,145,951
1310 DATA3,141,62,255,88,230,
3,208,990
1320 DATA2,230,4,76,157,19,16
9,8,665
1330 DATA32,195,255,32,204,25
5,96,147,1216
1340 DATA76,79,65,68,32,68,73
,82,543
1350 DATA69,67,84,79,82,89,13
,13,496
1360 DATA0,32,94,19,138,162,5
1,160,656
1370 DATA3,32,189,255,169,8,1
70,168,994
1380 DATA32,186,255,32,192,25
5,32,183,1167
1390 DATA255,201,0,208,228,96
,162,107,1257
1400 DATA160,20,32,105,22,32,
210,19,600
1410 DATA169,147,32,210,255,1
62,8,32,1015
1420 DATA198,255,173,95,22,20
8,19,162,1132
1430 DATA0,160,0,32,207,255,2
32,208,1094
1440 DATA1,200,192,1,208,245,
224,47,1118
1450 DATA208,241,162,0,32,225
,255,240,1363
1460 DATA64,32,130,20,192,0,2
08,57,703
1470 DATA32,140,20,201,65,144
,15,201,818
1480 DATA91,176,11,157,51,3,2
32,224,945
1490 DATA64,240,10,76,29,20,2
24,0,663
1500 DATA240,3,32,161,20,32,2
25,255,968
1510 DATA240,23,32,130,20,192
,0,208,845
1520 DATA16,32,140,20,201,65,
144,237,855
1530 DATA201,91,176,233,162,0
,76,52,991
1540 DATA20,169,8,32,195,255,
32,204,915
1550 DATA255,96,147,82,69,65,
68,32,814
1560 DATA84,69,88,84,13,13,0,
170,521
1570 DATA160,255,32,186,255,3
2,192,255,1367
1580 DATA96,32,207,255,72,32,
183,255,1132
1590 DATA168,104,96,172,95,22
,208,8,873
1600 DATA201,32,176,3,24,105,
64,96,701
1610 DATA201,192,144,251,56,2
33,128,96,1301
1620 DATA120,141,63,255,142,1
00,22,162,1005
1630 DATA0,189,51,3,56,233,65
,10,607
1640 DATA141,99,22,170,189,14
6,22,133,922
1650 DATA3,141,101,22,232,189
,146,22,856
1660 DATA133,4,141,102,22,160
,0,177,739
1670 DATA3,240,82,141,98,22,2
05,100,891
1680 DATA22,208,16,200,177,3,
217,50,893
1690 DATA3,208,8,204,100,22,2
40,23,808
1700 DATA76,212,20,238,98,22,
173,98,937
1710 DATA22,24,101,3,133,3,16
5,4,455
1720 DATA105,0,133,4,76,198,2
0,173,709
1730 DATA97,22,240,3,76,26,19
,141,624
1740 DATA62,255,88,32,128,22,
162,28,777
1750 DATA160,21,32,105,22,96,
32,78,546
1760 DATA79,84,32,70,79,85,78
,68,575
1770 DATA13,13,0,32,0,141,62,
255,516
1780 DATA88,169,13,32,210,255
,32,210,1009
1790 DATA255,169,5,32,210,255
,32,128,1086
1800 DATA22,169,158,32,210,25
5,162,15,1023
1810 DATA160,21,32,105,22,173
,97,22,632
1820 DATA240,4,32,64,17,96,17
3,96,722
1830 DATA22,240,42,32,171,255
,169,4,935
1840 DATA32,120,20,162,4,32,2
01,255,826
1850 DATA32,128,22,169,13,32,
210,255,861
1860 DATA169,4,32,195,255,32,
174,255,1116
1870 DATA32,204,255,162,8,32,
198,255,1146
1880 DATA169,8,32,180,255,173
,94,22,933
1890 DATA208,1,96,162,156,160
,21,32,836
1900 DATA105,22,32,204,255,32
,225,255,1130
1910 DATA240,11,32,228,255,20
1,89,240,1296
1920 DATA37,201,78,208,240,16
2,8,32,966
1930 DATA198,255,96,65,68,68,
32,87,869
1940 DATA79,82,68,32,84,79,32
,76,532
1950 DATA73,83,84,32,60,89,47
,78,546
1960 DATA62,32,63,13,13,0,162
,8,353
1970 DATA32,198,255,169,0,56,
237,198,1145
1980 DATA22,141,103,22,169,25
3,237,199,1146
1990 DATA22,141,104,22,201,0,
208,30,728
2000 DATA173,103,22,201,65,17
6,23,162,925
2010 DATA224,160,21,32,105,22
,96,78,738
2020 DATA79,32,82,79,79,77,32
,76,536
2030 DATA69,70,84,13,13,0,120
,141,510
2040 DATA63,255,173,198,22,13
3,3,173,1020
2050 DATA199,22,133,4,238,100
,22,160,878
2060 DATA0,177,3,172,100,22,1
45,3,622
2070 DATA165,4,205,102,22,208
,7,165,878
2080 DATA3,205,101,22,240,11,
165,3,750
2090 DATA208,2,198,4,198,3,76
,0,689
2100 DATA22,160,0,206,100,22,
173,100,783
2110 DATA22,145,3,200,185,50,
3,145,753
2120 DATA3,204,100,22,208,245
,238,100,1120
2130 DATA22,174,99,22,232,232
,224,54,1059
2140 DATA240,22,189,146,22,24
,109,100,852
2150 DATA22,157,146,22,232,18
9,146,22,936
2160 DATA105,0,157,146,22,76,
62,22,590
2170 DATA141,62,255,88,96,0,0
,0,642
2180 DATA0,0,0,0,0,0,0,0
2190 DATA134,5,132,6,160,0,17
7,5,619
2200 DATA240,12,32,210,255,23
0,5,208,1192
2210 DATA2,230,6,76,111,22,96
,162,705
2220 DATA0,236,100,22,240,10,
189,51,848
2230 DATA3,232,32,210,255,76,
130,22,960
2240 DATA96,200,22,201,22,202
,22,203,968
2250 DATA22,204,22,205,22,206
,22,207,910
2260 DATA22,208,22,209,22,210
,22,211,926
2270 DATA22,212,22,213,22,214
,22,215,942
2280 DATA22,216,22,217,22,218
,22,219,958
2290 DATA22,220,22,221,22,222
,22,223,974
2300 DATA22,224,22,225,22,226
,22,0,763
2310 DATA0,0,0,0,0,0,0,0,0
2320 DATA0,0,0,0,0,0,0,0,0
2330 DATA0,0,0,0,0,0,0,0,0
2340 DATA0,0,-1
```

USA Today

There are a lot of strange peripherals available for C64s in the States. Here's a cross section just to whet your appetite.

By Lewis Tilley

Do you have that tired, run down feeling? Does the big guy kick sand into your face at the beach? Do you want to compete better? Plug a *Bodylink* into your Commodore's cartridge slot and hook into the latest in sports training. This peripheral consists of the programs plus a "standard EMG sensor and lead set, head band and three electrodes" which you place against the part of the body you wish to monitor. The result reads out on your screen with the aid of the two software cartridges included.

Computerised Muscle Exerciser and Trainer or *COMET* is an electronic muscle builder which comes as an extra. A cardiac exercise and stress reduction package are also available. Prices run from $149.95 for the basic package up to $239.95 for the stress reduction gear. Mail orders to: Bodylog Inc, (see Touchline for address).

There is an italisized sentence in the firm's advertisement which will be reading more often as the use of computers expand into the mass markets: "Knowledge of computers or computer programming is NOT necessary to use *Bodylink*." That, for you, fellow!

To continue your physical education course, don't forget the latest in footwear. Puma's *RS Computer Shoe* has a computer chip built into its heel. After each training run you connect up to your 64 for a readout of the run record. The time, distance and calories you used will be fed in for a comparison with your past data and future dreams. Only $199.95 for a pair.

Now, let's see. We have the electrodes on your head, a computer chip on your feet, if you'll just stick your hand into this lightweight, cotton glove its sensors will do everything a joy stick will do for you and more. It's called *Hand Command* and comes from ShareData and costs $40.

Gone Fishing

Maybe you aren't a "jock", which is an Americanism for "athlete" coined from their supporters. Maybe you like to fish. Got just the thing for you. *The Computerised Fisherman's Fight Recorder* fits on to your pole to use its chip to remember how long and how hard you worked to catch that fish. Available from the US merchandiser, Hammacher Schlemmer, for $75.

But seriously Folks

Heavy, heavy, heavy is this very different printer interface, *Device One* from Progressive Peripherals and Software at a price of $119.95. The price is high, but the features overwhelmed the reviewers of this new attachment. It contains 32K bytes, a 6803 8 bit microprocessor and its own power source. 16K of that memory is used as a print buffer but it doubles in brass when it stores eight different fonts in that buffer as well. A utility disk comes with these fonts plus 22 varieties of the standard 8 × 8 font and an editor so that you can design your own. This graphics interface which links a Centronics printer to the serial bus of the Commodore deserves a thorough review of its abilities.

Device One is a challenger to *Super Graphix* by XETEC which has offered its high technology to Commodore users for some time now. You might check it out from XETEC Inc. at $99.95. Their disk includes 27 fonts to be used with the interface.

If your major printout problem is impatience, you can get three versions of *Serial Box* which stores in a 64K buffer while printing to a Commodore Compatible printer. The *Serial Box-Plus* is serial to parallel with 64K buffer, and the *Box-Max* is to a parallel printer and gives a massive 256K buffer. All of these include a font design and utility program called *Font Factory*. They are *GOES* compatible. R.J. Brachman Associates Inc. sell these at $79.95, $149.95 and $219.95 respectively.

Kaltek Labs, down in Puerto Rico, have devised an inexpensive way to scan a photo or drawing without the use of a TV camera. You attach a scanning head to your printer, or any typewriter, and connect to the 64's user port. The *Scammadore* system takes over to produce an image with its software which can be manipulated. The resolution is no better than might be expected, but it can be adjusted in tonal levels, exposure and contrast. Price for the complete kit is $54.95 from Kaltek Labs.

The best is yet to come. Berkeley Software, which revolutionised the new 64C, is working on an Apple *LaserWriter* driver for GEOS. The *LaserWriter* is a $5000 printer which responds to a text language from Apple called *PostScript*. It prints typeset quality text. Here in the States, some shops are offering the services of print-printouts on their *LaserWriters* from your disk. YC

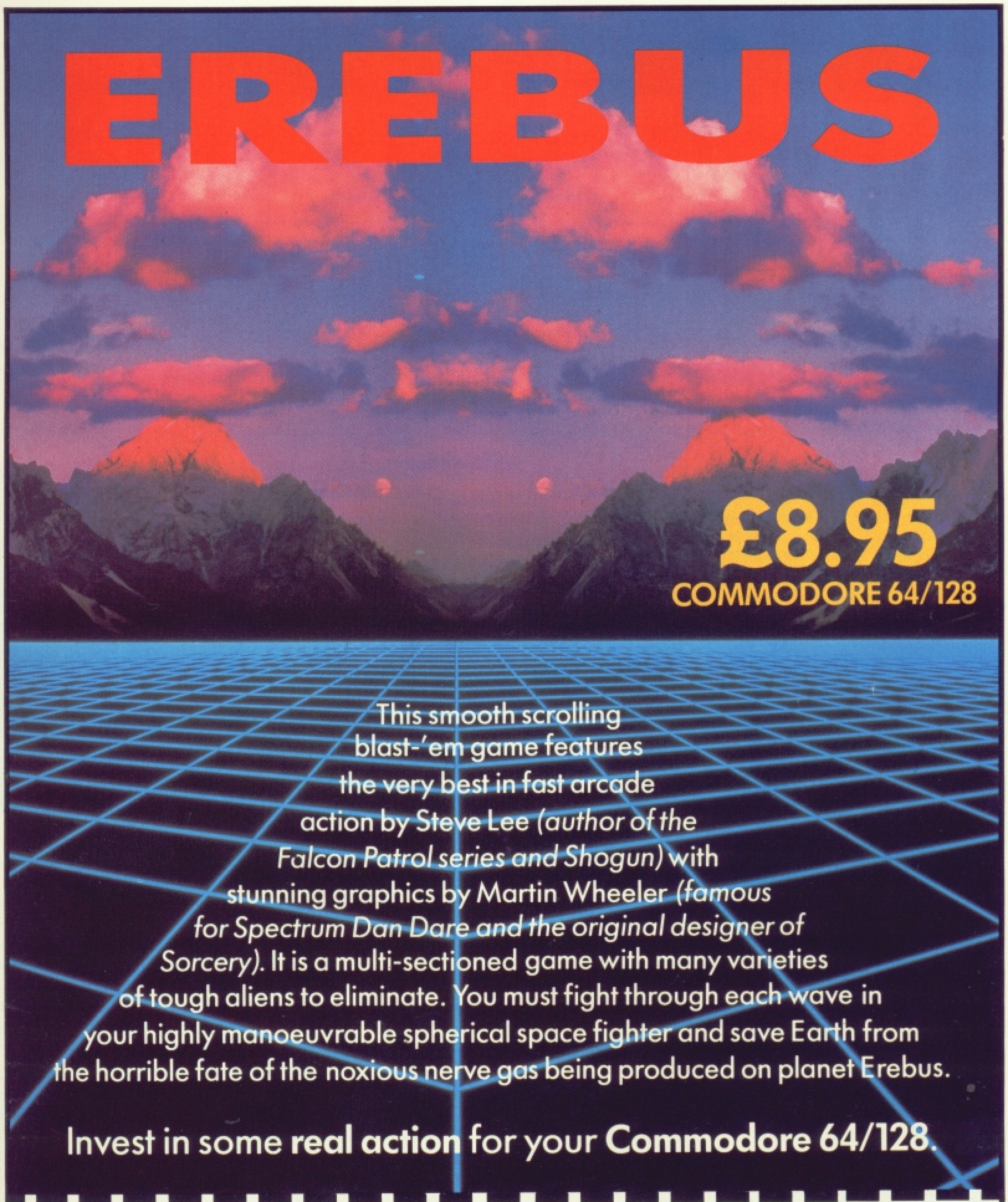
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In this new regular feature we bring you the best of strategy and adventure games together with some useful hints on how to improve your play.

The Pawn

Originally written for the Atari ST, *The Pawn* had rave reviews both for its graphics and for its complex parser.

Rainbird is the up-market arm of British Telecom's software interests and as with *The Jewels of Darkness*, this program is no cheapy at £19.95. But, considering that you get two disks, plenty of supporting written matter and an A3 sized poster, it is not bad value.

Insructions to play the game come in two small booklets, one Commodore specific and the other a general gameplay guide. There is also a very well produced 55 page book containing the background story and several pages of encyphered hints for the difficult bits.

The first option, that is highly recommended, is to make copies of two Pawn disks, henceforward to use these copies and retain the originals safely stored away. There is even a copy program included so that you need no additional utilities to achieve this.



This story is a strange mixture of ancient and modern, with old favourites such as dwarves, a missing princess, and all powerful magician and an ice castle with no doors. What this land of Kerovnia also has, are many oblique references to a more modernistic society that tends to replace the classic framework with a satirical identity which is both amusing and witty.

The final aim of the game is not spelt out, but with an unpopular king, a general election in the offing, some murky trading in the drinks market and groups of banished dwarves in the wings not to mention Kronos the Magician – anything is possible.

In common with those superb adventures from Infocom, this program makes a great deal of use of the disk drive. This regular disk access at most keyboard entries does mean that each move takes time to reach some form of conclusion, especially when large pictures are to be created.

The graphics are excellent but the full picture only allows three lines of text beneath it – so even more time is lost as you try to assimilate a number of lines of text, three at a time.

The instructions acknowledge this problem and recommend using another graphics mode, with only occasional peeks at the large pictures! One thing is certain, *The Pawn* offers a great variety of viewing and editing controls that should satisfy the most demanding player.

It is possible to get into quite a muddle with all the picture controls, whereby you are looking at a picture that is not that of your present location. GRAPHICS NORMAL puts everything right and you may then start your choice of graphics mode all over again.

The Pawn gives you a number of editing controls, a most useful one being the facility for calling back your last command for re-editing. Communicating with the game is fairly easy, as the parser recognises many different ways of saying the same thing. Leaving the Guru's hut may be accomplished by any of the following: LEAVE HUT, GO EAST, E, GO E, OUT, O, EXIT, EXIT HUT or EXIT EAST.

These are very simple commands but an example given in the instructions shows that the parser will also accept such a tortuous command as GET ALL EXCEPT THE CASES BUT NOT THE VIOLIN CASE THEN KILL THE MAN EATING SHREW WITH THE CONTENTS OF THE VIOLIN CASE! The parser will also understand when an object already specified, is to be used again: GET SHIRT THEN TIE IT TO RAKE.

Although this all sounds wonderful and indeed makes life that much easier in most cases, do not assume that the command interpreter is all powerful. You must still retain the true adventurer's cynical attitude and double check your surroundings.

An example of this may be found when you first arrive in Kerovnia. You are wearing jeans and a T-shirt and have a mysterious silver band sealed around your wrist. Obviously you immediately run an inventory check, this tells you nothing more. You know the program is renowned for its

parser so try FEEL IN POCKETS – great, the answer is "The pocket is soft". However it takes three more commands to ascertain what is in there.

If you get stuck, there are a number of hints given to help you. These are in the form of a series of two character blocks: AN Y5 N6 DO GO 5B. Type in HINT and you will then be asked to type in this code. There are usually three sets of code for each potential question, the first often gets a flippant response, the third is usually quite useful.

There will be several times where you have to talk to characters you meet along the way. The parser again offers you a choice of how to go about this. There is a useful command EXITS that will list all possible directions of movement from your present location. AGAIN repeats the previous command and SCORE gives you your current score and the maximum possible score.

With all these facilities to be shown off, what is the adventure itself like? There are lots of laughs, plenty of tongue in cheek satire and a reasonable difficulty level. Draw maps carefully as movement from one location to another is not always quite as you would expect it to be. SAVE your game position regularly (you'll need a previously formatted blank disk).

Altogether an interesting experience with a true adventure dressed up in the most modern mixture of programming technique and off beat humour. We will have to wait and see if these higher priced super-products can stand the competition from cheaper and less elegantly programmed adventures. For Magnetic Scrolls, *The Pawn's* programmers, I hope so – I'm looking forward to seeing their next offering. **P.F.**

Questron

Those of you who enjoy the *Ultima* series of adventures may well find that US Gold have come up with another winner in the same mould. *Questron* is a fantasy adventure game written by Strategic Simulations Inc in the USA. It is disk only but this is two sided – so there is plenty of program there to be explored.

The land of Questron has had a distinctly turbulent past. Everything fell apart at the seams some hundreds of years ago when one of the King's two chief wizards finally took the left hand path and became completely evil.

From that moment on, a greater and greater number of vile monsters invaded the countryside. The population began to seek shelter in underground towns, as these were the only places they could be sure of defending. Many were the knights that went out in the hope of defeating the evil Mantor, but none returned.

The countryside and towns are shown in plan view and dungeons in 3D. The symbols representing plains, jungle, mountains and swamps also look familiar.

This plan view takes up about two thirds of the display, with a number of action options to its left together with a brief status of the character's vital statistics. Reports of what is happening and your input commands appear ont he four lines at the bottom of the screen.

Control may be entirely from the keyboard or a mixture of joystick and keyboard. All keyboard action commands are single key presses, so the action is quick and simple to master. Whilst roving around you have such commands as: Arm (choice of weapon), Dismount, Fight, Hold Item (for use by Operate), Speak, Wear, Rob, Unlock, Take and Examine.

As you move your character, the screen scrolls past, disclosing further areas of the country. There are a number of towns to visit and in each you will find shops that sell different means of transport ranging from horses and llamas to rafts, clippers and eagles.

The towns also have two other places of great importance, Jails and Casinos. Bribe the warder and he will let you talk to one of the prisoners.

The Casinos offer three types of gambling 'double or nothing', 'blackjack' and 'roulette'. A cool head and careful strategy can make you a rich man fairly quickly. Gold is an important part of the game and the two main sources are by killing monsters and by gambling.

Food has to be bought at regular intervals and as you progress, you may also find a use for superior weapons and equipment. Be wary in the Casinos of winning too much, too soon. Win over 2000 gold pieces, the gambling is closed and the town guards will attack you. They are fairly tough and if you have not yet built up you hit points, you may come to an early end.

There are several Cathedrals to visit. These contain renegade magicians from the past and they are able to help you in several ways.

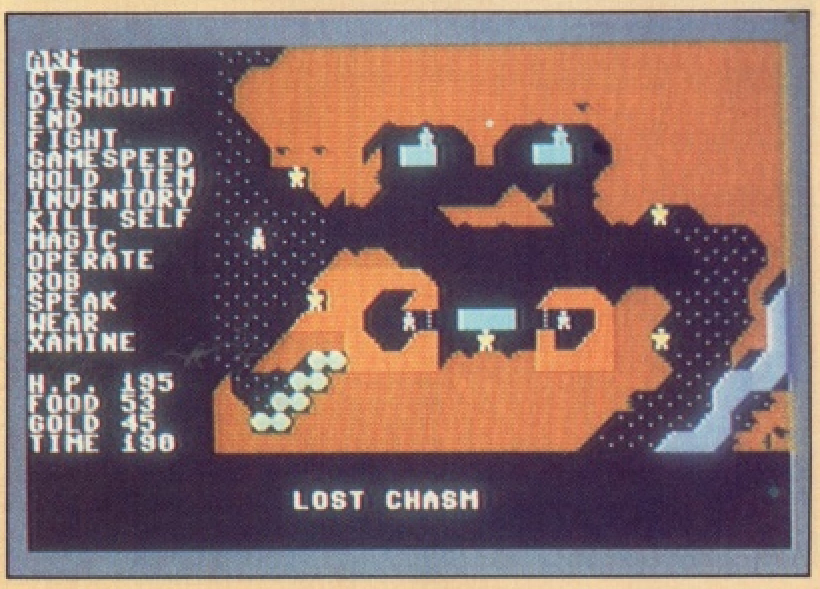
You start out with 15 points of your five main attributes: strength, stamina, dexterity, intelligence and charisma. These attributes may be modified as play proceeds and you become wiser to the ways of Questron.

There is one other main site for you to find on the mainland and that is the King's Castle. Here you will find the wizard Mesron, almost equal in power to the evil Mantor. Talk to him and he may well help you on your way.

Eventually you will want to talk to others in the castle but as they are behind locked doors, this is no easy task. First you will have to steal the right keys and this will bring any nearby guards hotfoot for the kill. You will have to have found a means of replacing your certain loss of hit points.

Once you have reached a high enough position in the land, you will be requested to seek out and destroy Mantor in his land of evil across the seas. Now you will have to find a way through those areas of thick choking fog that have so far evaded your exploration.

This evil land far to the west, has even today, got a few trading posts. Here you can buy various magical items and



several weapons that may be useful against the many new varieties of monsters found above and below ground. The Dungeons are rife with traps and all manner of nasty things, fortunately there are a fair number of treasure chests and magical caskets. You may even be lucky and find a compass.

For all those physical types that delight in roaming off into the great blue yonder, polish your boots and oil that sword, Questron needs a hero. Just remember, grab as much gold as you can, never talk to the guards and leave pinching the King's gold until you are sure of yourself. **P.F.**

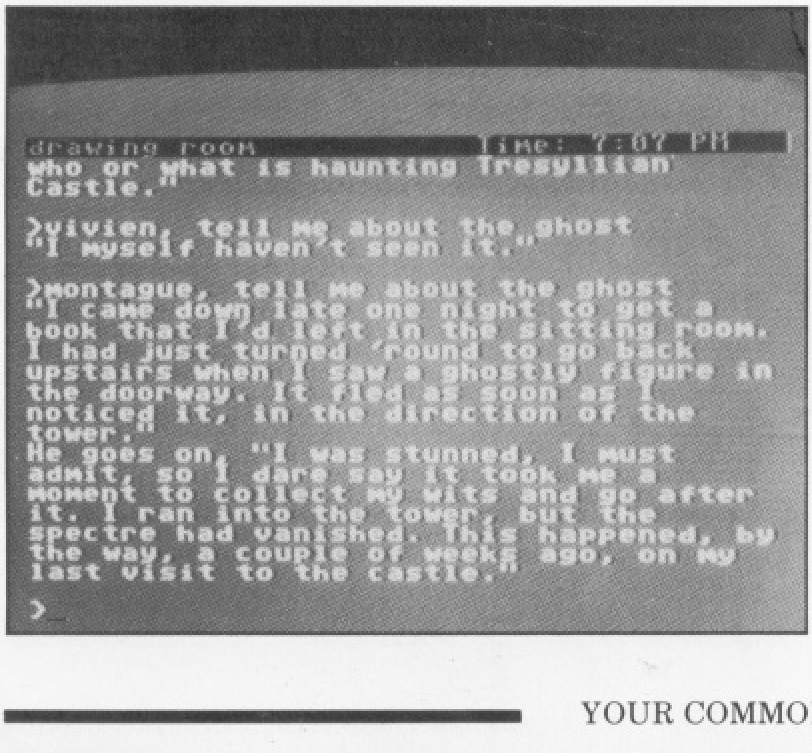
Moonmist

You receive a letter from one of your old friends Tamara Lynd in which she can't wait to tell you her news. She has become engaged to an English Lord no less and is going to live in Tresyllian Castle out in Cornwall – a lovely old place and reputedly haunted.

How things change! Eight days later, a second letter arrives and the tone of happiness has been replaced by one of sheer terror. Tamara is convinced that someone is trying to kill her. There have been two attempts on her life so far. Also, several of the guests at the castle have reported seeing the White Lady, especially after the unfortunate drowning of one of Lord Jack Tresyllian's former girlfriends. As you have a reputation as something of an amateur sleuth, she begs you to come over and see if you can clear things up.

So the story is set for *Moonmist*, the latest detective story from those masters of the adventure game 2 Infocom (distributed in the UK by Activision). The game is set at introductory level and is ideal for those of you who don't quite fancy yourselves as Sherlock Holmes just yet. At the beginning, you are prompted for your name and title, thus determining your sex. All the responses within the game are then adapted around your answer. You are also prompted for your favourite colour for there are no less than four different variations within the game so that it is not something that you just play once and forget about.

The game starts with you driving up outside the castle gates. You quickly meet some of the other guests before going to your room to dress for diner. No sooner have you taken a couple of bites than the plot thickens when a secret tape recorder plays a message from Lord Jack's late, eccentric uncle in which he states that there is treasure



hidden somewhere within the castle and grounds.

Treasure, a ghost with some very odd behavioural habits, the death threats to Tamara and the mystery of Deirdre's drowning when no body was ever discovered should keep even the most brilliant detective quiet for a bit. You will have to go round the castle, searching for clues and secret passages and asking the guests what they know about varius people or objects.

For once, the atmosphere created within the game is not up to the usual Infocom standards. The main reason for this is that the Americans have no idea how the British upper classes behave save what they have seen at the pictures. A Coldstream Guards officer sounds more like Eliza Doolittle's father in My Fair Lady whilst the butler does a very good impression of Bertie Wooster rather than Jeeves. These idiosynchrasies aside, the rest of the game is well up to standard with reams of excellent text descriptions and (thank goodness) no graphics.

Infocom is also famous for the way in which the games are packaged and *Moonmist* is no exception. A book on the ghosts of Cornwall, a tourist brochure to the castle, Tamara's two letters and an iron-on transfer for a tee-shirt are all included. If you have always fancied yourself solving a major crime, or four in this case, you could do a lot worse than discover why *Moonmist* has helped to make Infocom the best adventure writers in the business by a long way. **G.R.H.**

Silicon Dreams

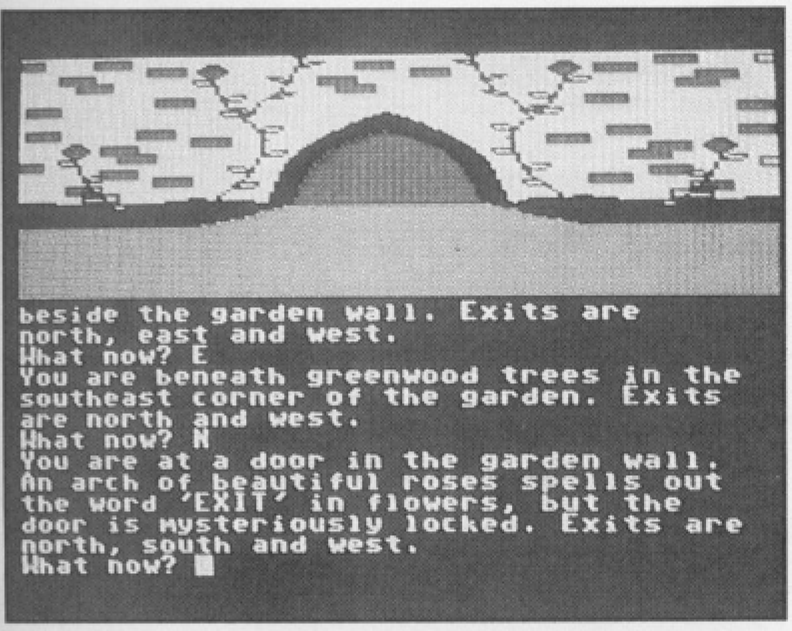
For some reason or other, most adventure plots have been more concerned with orcs and wizards rather than spaceships and lasers. For the discerning sci-fi buff, there has been a distinct lack of decent games. Now, their wait is over for Rainbird has put together three of Level 9's old games into one large compedium.

Silicon Dreams is the title and the games included are *Snowball, Return to Eden* and *The Worm in Paradise*. The games have been re-written and expanded to make use of Level 9's latest parser and compression techniques. In the case of *Snowball*, graphics have been included for the first time.

You play the part of Kim Kimberley, secret agent extra-ordinaire. In *Snowball*, you are charged with protecting an interstellar from your hibernation, you are aware that something is dreadfully wrong but have no idea what. Sinister nightingales lurk and pursue you as attempt to make your way to the control room and stop Snowball 9 from crashing into the planet Eden. The fate of a mere two million people lies in your hands.

Although you managed to save the ship, it was sabotaged and several powerful people have put two and two together and made five when they found you guilty of sabotage. Sentenced to death, you managed to escape and became the first of your race to land on Eden. You must reach the robot city of Enoch and stop them from destroying Snowball 9. As if that wasn't enough, the crew of Snowball are still after your blood.

In *Worm in Paradise*, the setting is the city of Enoch 100 years later. The organisation of the city is somewhat strange being based on zero taxes, instant fines for crime and a booming business in spare parts for transplant surgery – you are immortal if you can keep replacing the necessary bits.



You start off trying to make money but there is something definitely wrong. Can you, a mere citizen manage to save the world?

The games allow complex sentences to be input and the parser supports such features as 'get all' and the use of 'it' as in 'get box and open it'. You can save the game to tape or disk as well as more temporarily to RAM. Another useful command is 'OOPS' which allows you to correct those irritating little mistakes that just happened to kill you by stepping back a move. The games come complete with full instructions and a 42 page novella entitled 'Eden Song'.

Even if you already own one of the adventures, you should still seriously consider this package in its updated form. If you haven't got any of the games, then *Silicon Dreams* has got to be one of the bargains of the year at £14.95. **G.R.H.**

Battalion Commander

If you've ever fancied yourself as a tank commander, here's your chance to prove that you really are a latter day Rommel. Not only do you get to control a tank, but a whole armoured battalion.

The setting for this latest wargame from the US Gold/SSI stable is a land battle at some stage in the near future. You can choose to play American, Russian and, unusually, Chinese forces over a set of variations that is absolutely mind-blowing. If the problems of controlling an entire battalion was not hard enough in the first place, the whole game takes place in real time so there is no sitting back slurping a cup of coffee and pondering over your next move.

There are five basic scenarios. Novice is just there to let you get used to the controls. Pursuit and exploitation is an incisive thrust into enemy territory. Meeting engagement is a chance encounter. Attack sees you trying to break through the enemy lines as you try to reach a key objective and defence is the exact opposite. You can choose which side you want to be, which of 40 different terrains you wish to fight over and whether or not you want to alter the relative strengths of the two sides.

Control of your units is very straightforward. One letter to designate the unit and a second to issue the order. There is also a moving cursor to designate the area you wish to shoot at or move to etc. You can command include moving, firing normally, providing suppressive fire or creating a smoke screen. Enemy units only appear on the map when they have actually been discovered.

Apart from your tanks, you may also find yourself in control of supply trains, anti-tank units, scouts, heavy mortars and engineers.

The game looks deceptively easy. Starting at novice level, nothing happened for a few moves until I found the enemy and destroyed it without taking any damages. As soon as I started playing for real, everything was on a much grander scale and I got wiped out without any apparent effort on behalf of the enemy, most of whom I never even saw. Coming complete with an excellent 20 page instruction booklet, Battalion Commander is one of the best wargames yet produced for the C64. **G.R.H.**

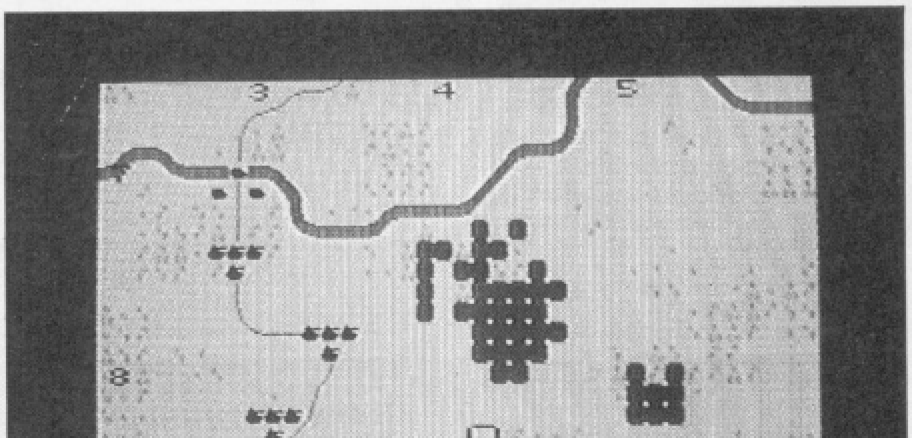
Touchline:

US Gold: *Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.*

Rainbird: *First Floor, 74 New Oxford Street, London WC1A 1PS.* ***Tel:*** *01 240 8838.*

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Hack Pack 128

An excellent extension package for the C128

By Stuart Cooke

When the C128 was launched, its improved version of Commodore Basic was widely acclaimed. It was now possible to produce sound and graphics with far greater ease than with the outdated Basic of the C128's little brother the C64.

A plethora of Basic extensions are available for the C64 to make it easier to use, even *Your Commodore* has published some in the past. However, with the new powerful Basic of the C128 you would think that it would be unnecessary for anyone to produce an extension package for the C128, Systems Software obviously think differently as they have produced an excellent extension for the C128 called *Hack Pack*

Hack Pack can be split into three distinct sections and it is up to you which ones you actually LOAD and use. Available for use are a Basic/programming toolkit, a RAM-Disk and a program compressor.

The RAM-Disk

This is probably the strong point of the package and a must for anyone who requires instant access to small programs.

The C128 has, as its name suggests, a large amount of memory. In most applications not all of this memory is required by the user and is wasted. The RAM-Disk option of *Hack-Pack* allows you to set up this area of memory as a disk-drive. of course it has no moving parts but it is possible to SAVE programs in this area, you can get directions of files that are stored in there and most of the normal disk commands work.

If you are using Basic the RAM-Disk is allocated two blocks of memory at the top of banks zero and one. This does mean that the amount of memory that is used for Basic is reduced but this doesn't affect your programs that much since you would be very unlikely to have a Basic program that takes up all of the available memory.

Should the RAM-Disk clash with your own programs then commands do exist that allow you to locate it wherever you want in memory. I wouldn't expect a novice programmer to understand how to go about this but should you feel competent the manual is very clear and you should have no problems.

```
10 REM ***************************
*
20 REM * THIS IS A DEMO PROGRAM
*
23 REM ***************************
*
30 FOR X = 1 TO 1000
35 PRINT "THIS IS A DEMO PROGRAM
";
40 NEXT X
45 PRINT
46 PRINT
50 REM
60 FOR Y = 1 TO 1000 STEP 3
70 PRINT Y;
80 NEXT


AFTER COMPACTING

30 FORX=1TO1000:PRINT"THIS IS A
DEMO PROGRAM ";:NEXTX:PRINT:PRIN
T:FORY=1TO1000STEP3:PRINTY;:NEXT
```

FIGURE 1

As you are no doubt aware the Commodore disk drive is set up as device number eight. To avoid a clash with this the RAM disk is accessed as device number nine, again this can be changed by the user.

So what is the advantage of using a RAM-DISK? Firstly there is the advantage of speed. A program can be SAVEd and LOADed into and from a RAM-Disk almost instantly. This has the advantage that if there are a number of programs that you are going to require a lot you can swap the one that you are using very easily.

The COPY command has been extended to allow you to copy between the RAM disk and a normal disk drive. It is possible to COPY single files between both the normal and RAM disk however the most useful feature is the ability to make copies of all the files on the RAM disk on a normal disk with one simple command.

Toolkit

As I have already stated it is difficult to think what commands are missing from the C128's Basic. System Software has however managed to select some extremely powerful and useful commands for this extension.

Should you want to make changes

within a Basic program then it is actually quite difficult to find the area of the program that you wish to make changes in. Wordprocessors get around this with a SEARCH and REPLACE command which allows you to search through a document for the occurence of any word and turn it into another one. *Hack Pack* has a FIND command which will allow you to search through a file for a specific word. There is even an option that allows you to specify which section of the program is actually searched.

An extension of the FIND command CHANGE, allows you to search a program for a specific word and change it into another.

DUMP will print a list of all variables, functions and arrays that have been set up to be printed out. This is extremely handy when debugging a program since it allows you to see at a glance the state of all variables.

INFO will give you some interesting data about the status of the computer. Printed out after an INFO command are:

Number of bytes occupied by Basic.
The number of bytes occupied by variables.
Number of bytes occupied by arrays.
Number of bytes occupied by stings.
The number of bytes available for Basic text.
The number of bytes available for variables, arrays and strings.

MERGE will allow you to MERGE two files together in memory. This is extremely useful if you have a number of subroutines stored on disk since you can add them to your latest masterpiece with this command.

TYPE will take an ASCII file from disk and print it on the screen. SIZE will display the size of the specified file in bytes and can be used with any type of file and the QUIT command will de-activate the toolkit.

Compressor

When you are writing a program in Basic it is useful to space the program out as much as possible with a small number of statements on each line. To make it even clearer you may even REM the program to make debugging easier. A more efficient and memory saving method of program writing is to place numerous statements on one line. What a compressor does is take a specified file, remove all unnecessary spaces and all REM statements then it reduces the number of lines in the program by placing as many statements on each line as possible.

Figure 1 shows a program before it has been passed through the compressor and after it has been compressed.

Hack Pack is an extremely useful addition to the collection of a serious C128 owner. Even in the short time that I have had it for review I have found it indispensible and use it regularly, the RAM-Disk being exceptionally useful.

Touchline

Name: *Hack Pack.* ***Machine:*** *C128.* ***Supplier:*** *Systems Software (Oxford) Limited.*

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Gauntlet

The most popular arcade game in the last 12 months has been brought to the small screen. Enter a world of heroes, magic and lurking danger.

By Marie Curry

Gauntlet is a two player arcade game which is totally addictive, as many of you will know from the hours you've spent shoving your hard earned pennies into arcade machines.

Now it's been released for the C64 by US Gold and is set to be a number one.

It's a one or two player game, but take my advice and stick to the two player option. There are two reasons for this, the first is that you'll get much further with it and the second is that it's a great deal more fun. You can decide to help or hinder each other (you play simultaneously) but watch out for treachery if you're supposed to be co-operating. If you're both low on health point then there could a mad dash for the nearest succulent turkey to pep you up and the loser may dwindle away to a pile of bones!

When you start you are given a choice of four characters. You can choose to be either Thor the Warrior, Thyra the Valkyrie, Merlin the Wizard or Questor the Elf. Each has different attributes and strong weak points. For instance, Thor's got great armour and is very good at hand to hand combat, however he's pretty poor on the magic front. Merlin, on the other hand, has no magic, can't fight very well with his bare hands but good at zapping people.

Once you've decided which persona you want, then you can go straight into the game. Monsters abound. Ghost, Grunts, Demons, Lobbers, Sorcerers and Death. Each have different ways of draining your energy and they all come in droves except Death, although numbers of these increase on the higher levels.

When you first play the game you may be quite daunted by the numbers of villains which you are expected to destroy in order to work your way around the mazes. The best way to get around this problem is to head for the generators. These are little square blocks which look different depending on which kind of monster they are churning out. Shoot these and the number of monsters can be controlled. Get rid of all of them and you can safely walk around a section to explore.

In and around the dungeons are objects to pick up to increase your chances of success. Potions are very useful as they are the only thing which can kill Death (which sounds like a contradiction in terms but isn't in this context). Special Potions give the player special abilities. You can also grab extra armour, magic power, shot speed, shot power, fight power and pick up power which are pretty self explanatory.

Food is probably the most important thing to collect as this keeps you going. There are joints of meat lying around and bottles of cider. Be careful not to shoot the cider, before you can get to it. Poisoned cider looks slightly different so watch out for it since it decreases your health points. There are keys to open doors and loads of treasure to pick up. An amulet will make you invisible for a while. Traps are glowing patterns on the floor which remove some walls and transporters take you from one area of the maze to another. Exits are labelled black squares which move you to another level. It will not necessarily be the next one, you can skip around quite a lot which means that the game has little chance of getting boring as there are hundreds of levels. There are also Treasure Rooms which you stumble on at random. These are bonus screens with no villains but there is a time limit. You must collect as much treasure as possible and find the exit. The limit is usually 10 seconds.



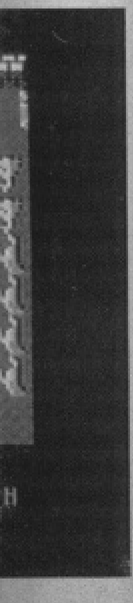
The whole game is impossible to map, there are just too many mazes and it wouldn't help very much anyway. All the dungeons are very different in layout and some of them are extremely complicated. Some have only one exit, others have several.

There are many different ways to play the game. You can go for a high-score, you can try and get to the very high levels, you can work alone or in partnership, all have their own advantages and all are fun. It's a fascinating game and well worth every penny.

Touchline
Title: *Gauntlet.* ***Supplier:*** *US Gold, Units 2/3 Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.* ***Machine:*** *C64.* ***Price:*** *£9.95 tape, £14.95 disk.*
Originality: *6/10.* ***Graphics:*** *7/10.* ***Playability:*** *10/10.* ***Value:*** *10/10.*

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Merlin Assembler

Assemblers aren't very common for the C16 and plus/4. However we've managed to have a look at this one from Wizard Software.

By Paul Eves

Merlin Assembler is a full 7501, two pass assembler for the Plus/4 and C16. It comes both on Tape and Disk. Wizard have gone for a green screen display once the assembler is activated. This is for 'eye comfort'.

The program assumes that the user has a knowledge of 6502 machine code, so if you are not familiar, I would suggest you acquire some before attempting to use this package. Because Merlin resides at $1000 to $21000, Basic has been moved to $2101. Once you have a source listing ready to assemble, you just type ASM and press return.

Once loaded, *Merlin* leaves the Basic intact. Therefore you may still use the already familiar editing features of Basic. Basic may also be integrated in the source listing. However, all Basic lines must be after the END statement, and are activated by GOTO and not RUN.

Program Designing

When designing a program using *Merlin*, the first instruction must be the COM command. This command tells the assembler where to start assembling in memory from. If this command is missing then your program will not be assembled e.g.

```
10 COM $5000
20 LDA # $FF
30 END
```

This would begin assembly from $5000 onwards. In other words the instruction lda # $ff would be the first instruction at $5000.

As COM is the first instruction of any assembly program, END must be the last. If END is missing the assembler will not know when to stop assembling. In this event, should you have a Basic program after your source code, the assembler will flag every unrecognised line as a syntax error.

The LIST command allows you to see what has just been stored into memory. If you do not wish to see everything, you may insert a STOP command e.g.

```
10 COM $5000
20 LIST
30 LDA # $FF
40 STOP
50 LDY # $20
60 STA $D6
70 END
```

The above program would produce the following display on the screen after the copyright notice:

```
5000 AD FF LDA # $FF
READY
```

Note that lines 50, 60 and 70 have not been listed, this is because of the STOP command. If you wish to LIST the whole program then leave the STOP instruction out.

Labels

The use of labels in assembly language programming is essential. Notice I said Assembly Language programming and not Machine Language programming. Nobody in their right minds would attempt Machine Language programming these days, unless they were from the old days of large complex machines.

Labels can be used anywhere within your source code, but must be after the first COM command. All labels must be preceded by a full stop, e.g. .LOOP and .GOT are valid labels, but LOOP and GOT are not. The use of labels makes the task of the programmer that much more enjoyable. Consider the following small program:

```
10 COM $5000
20 LDA # $FF
30 JSR .DELAY
40 LDA # $01
50 LDX # $00
rest of program here
210 .DELAY DEX
220 BNE .DELAY
230 RTS
240 END
```

Instead of having to calculate forward or backward addresses, you jut put in your labels and the machine does the hard work for you. Labels also make for better program design in my opinion.

Two instructions that are pretty useful are *TX and *DA. These allow for the storage of data as either ASCII values or NUMBER values e.g.

```
*TX "YOUR COMMODORE IS TEXT"
*TX "SO IS THIS"
```

This would store the above two sentences in memory under their ASCII codes.

```
*DA $50,$FF,255,$80FF,32768
```

This would store the numerical values into memory. Note the mixture of both hex and decimal numbers. (As is standard, the '$' is put in front of any number that you wish to be taken as hex.)

Comments

Another important feature of assembly programming is to somehow put comments within the program. This is so that both the programmer and anyone reading the listing can see what's going on. This is far more important in assembly programming than in Basic programming. The way we achieve this with *Merlin* is by the use of remarks. A ';' denotes a remark. A remark can be left in the source listing on a line by itself. Alternatively, you can put a remark at least one space after the instruction with either way ';' or without it e.g.

```
10 LDX # $00 ;Zeroise the X reg
20 ;Ready for indexing a list
30 LDY # $00 zeroise the Y reg
```

All the above are valid remarks.

On assembling, any errors found are reported back to the user on screen. The format being LINE:NUMBER :THEN THE ERROR. For example:

```
20 LGY # $00
```

would produce the error

LINE:20;SYNTAX ERROR.

Obviously there is no instruction LGY.

Although this program is not as powerful as the Assembler I am used to (HS64 and PAL to name but two), I found it easy and quick in execution. Beginners to Assembly programming will find *Merlin* a very good aid to the development of their programs.

Extra

There are two extra points where I think this particular assembler scores over most others, that is the assembler has some intelligence of its own. To make this more understandable, look at the following short program.

```
10 LDX # $00
20 LDY # $DD00
30 LDA ($DC),X
40 LDA ($DC,Y)
```

Line 10 is legal and valid. Line 20 is not valid, however the assembler would assume that you meant LDY $00, in other words it ignores the HI order byte and loads the accumulator with the LOW order byte. Lines 30 and 40 are both common errors that you will make, (Indirect index addressing always manages to confuse people). On encountering these types of errors, the assembler would assume that you meant 30 LDA ($DC),Y and 40 LDA ($DC,X) respectivley, This feature of the assembler is, in my opinion, its greatest asset.

I have to be totally honest, and say that as my knowledge of the Plus/4 and C16 is somewhat restricted, I could not give this package the kind of indepth trial that I would prefer. However, from what I have seen of it so far I have no hesitation in saying that it is a good buy.

Touchline
Wizard Software: *20 Hadrian Drive, Redhills, Exeter, Devon.*

Games Reviews

As always there is a wide variety of games currently available. We've picked out a selection for you to peruse.

EREBUS

I know you're not going to believe this. Earth is in danger again and you've got to save it!

Erebus is a distant planet used by man to reprocess dangerous waste. Now some unpleasant aliens have reprogrammed it to produce a killer nerve gas to wipe out mankind. Naturally you, alone, are sent to obliterate these Hadeans and save the world.

The refinery is split into circular levels that you must orbit, zapping aliens as you go, until a dimension duct opens letting you through to the next level.

Each level consists of raised barriers and objects designed for you to crash into while being chased by missile firing aliens.

In between levels a bonus screen helps you to practice your shooting skills but it doesn't save the game from becoming yet another Uridium inspired shoot-em-up. **T.H.**

Touchline

*Title: Erebus. **Supplier:** Virgin, 2-4 Vernon Yard, Portobello Road, London W11 2DX. **Tel:** 01 727 8070. **Machine:** C64. **Price:** £8.95.*
***Originality:** 4/10. **Graphics:** 6/10. **Playability:** 5/10. **Value:** 6/10.*



DESTROYER



Take the helm of a US Fletcher class Destroyer as well as the guns, depth charges, torpedoes, sonar, radar, navigation and damage controls stations in a Dambusters systle multi-screen game.

Thirteen stations all together must be monitored and perfected if you are to complete one of the seven scenario's in which you must escort convoys, hunt submarines, rescue pilots and run blockades.

Each station has its own controls and impressive graphics ranging from the bridges bank of controls to the blip on the sonar screen.

After a mission briefing, you're on your own. Typing in two letter commands moves you between stations where you can plot courses or set depth charge depths ready for a submarine attack.

As the action hots up you will have to assign damage control crews, fight the enemy and keep the ship off dangerous reefs.

The game plays very well and soon you'll be fighting your way through the difficulty levels earning your stripes as a Destroyer captain.

Destroyer is very similar in play and style to Microprose's chart topper Silent Service only this time you keep your head above the water. **T.H.**

Touchline

Title: *Destroyer.* ***Supplier:*** *US Gold (Epyx), Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Price:*** *£9.99.* ***Machine:*** *C64.*
Originality: *6/10.* ***Graphics:*** *9/10.* ***Playability:*** *8/10.* ***Value:*** *9/10.*

FLASH GORDON

Flash, you've only got 24 hours to save the world! The evil Emperor Ming has targeted planet killer missiles at earth and you must stop him.

Unfortunately, the only way you can do this is to kill Ming before he fires them from the controls he always carries with him.

The mission hasn't started well as your ship crashed into a jungle instead of blowing Ming's palace apart. Now you have to search out Prince Barin and win his confidence (by beating him senseless) and ride to Ming's Palace on a bike he'll give you while fighting Ming's minions.

All this must be completed within 24 hours which isn't easy as you lose valuable time whenever a jungle monkey or snake chomps you or Prince Barin defeats you.

Luckily this 24 hours doesn't include loading time as the game plays in three parts and you must complete them in order.

Yet another excellent game in Mastertronics M.A.D. series. **T.H.**

Touchline

Title: *Flash Gordon.* ***Supplier:*** *Mastertronic, 8-10 Paul Street, London EC2A 4JH.* ***Machine:*** *C64.* ***Price:*** *£2.99.*
Originality: *8/10.* ***Graphics:*** *8/10.* ***Playability:*** *6/10.* ***Value:*** *9/10.*



INFODROID

Prepare for the ultimate in excitement. A game based on motorbike messengers that pick up and deliver parcels! OK, so the bikes are in fact custom built droids and it's set in the future but the action delivered by these futuristic Postman Pats is pathetic.

The transport system used by the infodroids is extremely silly and consits of causeways split into four lanes travelling in each direction. Easton lane consists of a series of platforms that travel faster the further it is from the central causeway. Down the centre of the causeway are lift entrances to the companies that you deliver to and from, garages to repair your droid and junctions to get to the 14 other causeways.

The result is that the droids must hop around these speed platforms like demented froggers until they finally find their destination. As for this game, it's going nowhere. **T.H.**

Touchline

Title: *Infodroids.* ***Supplier:*** *Beyond, Wellington House, Upper St Martin's Lane, London WC2H 9DL.* ***Tel:*** *01 379 7709.* ***Machine:*** *C64.* ***Price:*** *£8.95.*
Originality: *6/10.* ***Graphics:*** *5/10.* ***Playability:*** *6/10.* ***Value:*** *5/10.*



TRIVIAL PURSUIT — YOUNG PLAYERS EDITION

This is the first of Domark's additional question packs planned for its Trivial Pursuit game.

This one's for the younger trivialists and contains two sets of questions for seven to 11 year olds and 12 years up.

The gameplay is identical to the original Genus edition except the categories have now changed to Nature, Science/Technology, Art/Culture, Good Times, Games/Hobbies and People and Places.

While playing the game you can find out such fascinating facts as that silver is used to make film, who introduced That's Life, that the Alm-Uncle is Heidi's grandfather and the colour of a cricket ball.

This edition is available in two different versions either

as a complete game or as a 3000 question expansion pack for the original game.

Obviously this one's for the youngsters and will be good training for the Genus edition but who wants to be beaten by an eight year old?

Other planned editions include the Genus II and Baby Boomer packs. **T.H.**

Touchline

Title: Trivial Pursuit – Young Players Edition. ***Supplier:*** *Domark, 204 Worple Road, London SW20 8PN.* ***Machine:*** *C64.* ***Price:*** *£14.95 (full game) £7.95 (question pack).*
Originality: *1/10.* ***Graphics:*** *6/10.* ***Playability:*** *9/10.* ***Value:*** *8/10.*



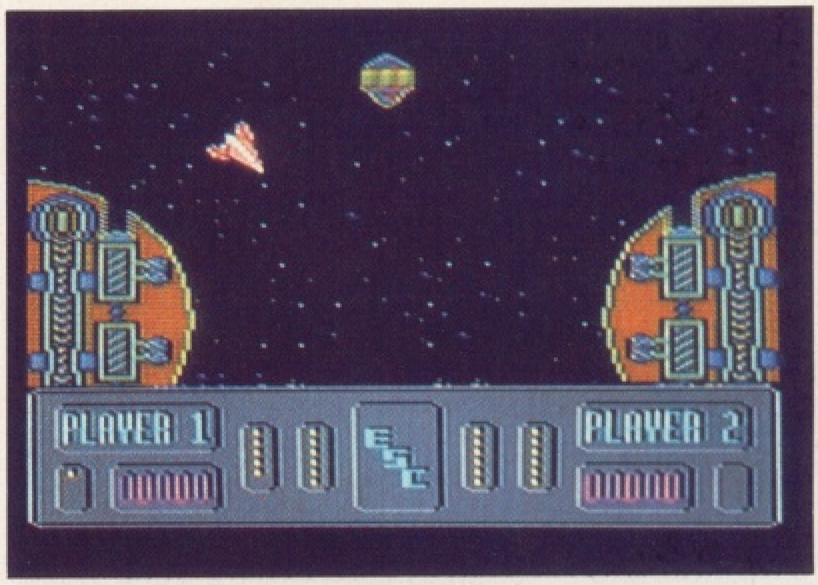
MEDIATOR

When the Americana label wass first launched, most people saw it as the label on which US Gold would dump all their games which failed the grade, thereby recouping some, if not all, of their losses. Time, however, has shown that although there have been some poor releases, on the whole, the label has maintained a very high level of quality; and with releases such as Go For Gold, the label has become a firm favourite with Commodore 64 owners.

All this said, the latest release, Mediator, may well be remembered by some of you as it was released, admittedly more than a few months ago, by English Software, a company which, in its time, has had quite a few hits. Why mediator was not a hit is a matter for conjecture, but at £2.99, it really does deserve to make the grade.

The game is set long ago, when a doomsday machine was placed in high orbit above the satellites Xylos and Pholos, with a sole role to deter further attacks of nuclear war between the empires of the galaxy. If this satellite detects undue levels of nuclear activity, it will be activated, and it will then destroy both civilisations.

As the saviour of the galaxy, it is your task to locate the legendary Good Mediator to acquire the mythical time crystal, which will then allow you to solve all the problems of your galaxy. Graphically, Mediator shows its age in more ways than one. The actual animation is very good, but the

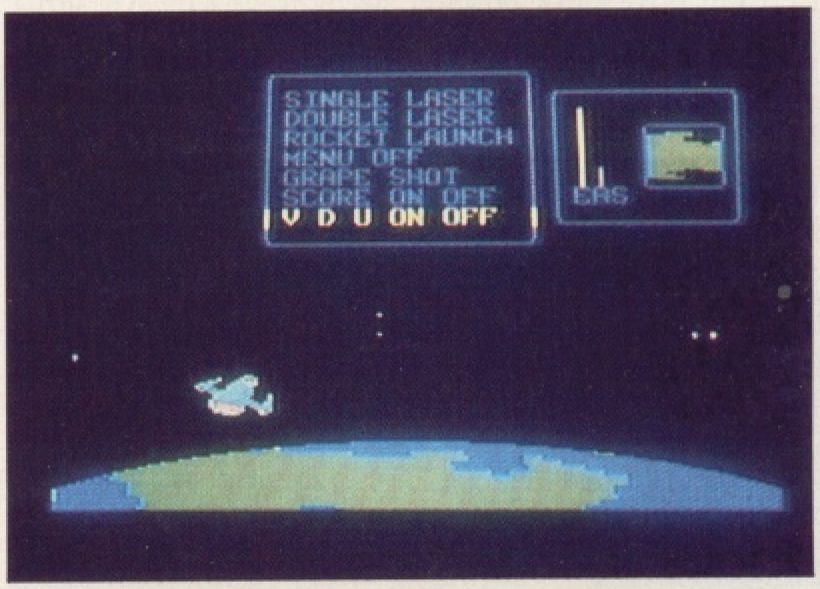


split screen has some raster problems, and the backgrounds are less than perfect.

The music too reflects the age of the game, especially the background music which is nothing short of nauseating. The fact is that this game is not trying to be sold at full price, therefore many criticisms must be ignored, purely because the game represents such excellent value for money. If you can stand the graphics and sound, then the game is as good as many more recent full priced games, with more than enough problems to last the average arcade game fan happy for many an hour. **F.J.**

Touchline

Title: Mediator. ***Supplier:*** *US Gold, Units 2/3, Holford Way, Holford, Birmingham, B6 7AX.* ***Tel:*** *021 356 3388.* ***Price:*** *£2.99.* ***Machine:*** *C64.*
Originality: *6/10.* ***Playability:*** *6/10.* ***Graphics:*** *6/10.* ***Value:*** *6/10.*



DEFCOM

By the year 2056 the Strategic Defence Initiative "Star Wars" system was in position and had been installed, worked and captured by aliens that turned it into a weapon

against the now peaceful Earth.

Luckily you as Nick "Daring" Diamond can still fly the only surviving anti-aircraft weapon and warp off to save the world.

Unfortunately, you only have a single firing laser and must blast away at the attacking aliens and the killer satellites over the planet rotating below.

The action is fast but also non descript as you'll soon tire of this and look to the extra options such as a twin firing laser and displaying your score on the screen! However, these are selected from a menu while the game continues so you won't live long enough to appreciate them.

Yet another game where a good idea has been let down by a poor game. **T.H.**

Touchline

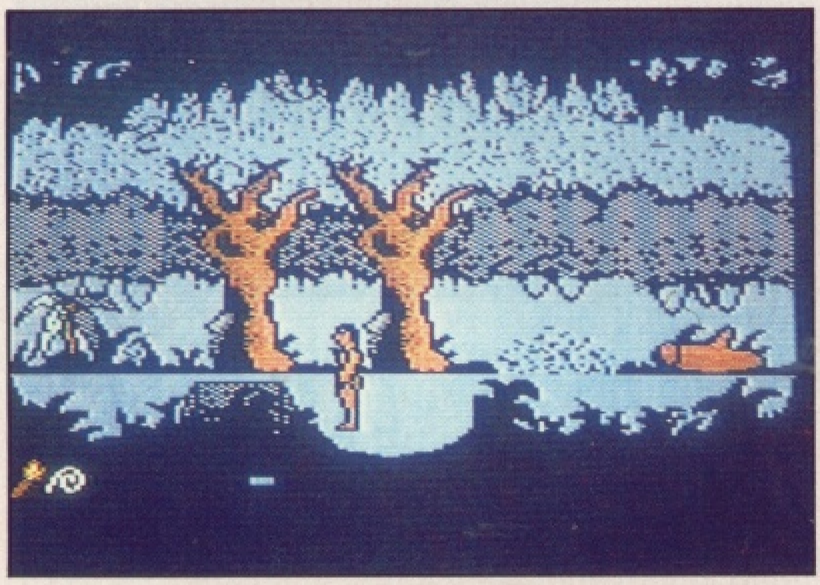
Title: *Defcom.* ***Supplier:*** *Quicksilva, Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01 439 0666.* ***Machine:*** *C64.* ***Price:*** *£8.95.*
Originality: *6/10.* ***Graphics:*** *5/10.* ***Playability:*** *4/10.* ***Value:*** *4/10.*

TARZAN

*F*rom the western coast of the Congo, to the palm-fringed shores of Zanzibar, African folklore tells of the legendary exploits of one man, that man was Tarzan, Lord of the Apes. Left as an orphan in the jungle, Tarzan was nursed by a she-ape, Kala, and Tarzan learnt the laws and language of the jungle.

Only later in life was it discovered that Tarzan was really none other than John Clayton, Lord Greystoke. Whether or not he was a Peer of the Realm, Tarzan was still himself at heart, and whenever necessary he would don his leather loincloth and swing, Weissmuller-style through the trees.

Even as we speak, however, needs drove Tarzan to shrug off the thin veneer of civilisation and brave the perils of the jungle once agian. Lady Jane Greystoke (her of "me Tarzan, you Jane" fame) has been abducted by Usanga, chief of the Wamabo, and she will meet a terrible and agonising death, unless Tarzan retrieves the seven gemstones which have been stolen from the tribal shrine.



This is the setting for Martech's latest romp, and it could be the beginning of the end for anyone who loves addictive arcade adventures with a necessarity for mapping. In three computer days, you must control Tarzan until you have finally collected all seven gems, and only then will you have any chance of saving Jane.

To help Tarzan, their are various animate and inanimate objects that must be collected, including ropes, monkeys and different coloured shields. Without these items, Tarzan will never complete his mission, so a keen eye is essential.

The first thing anyone will notice upon loading the game is Rob Hubbard's incredible soundtrack which, technically, must be his most impressive to date. With only 4k free, Rob has managed to get the whole Tarzan theme, complete with incredibly authentic bongos, as well as a host of effects including a nighttime section complete with chirping crickets!

Once loaded, the quality of the graphics is also apparent. Nice backgrounds and an excellently animated Tarzan all add to the feeling of the game, although the time taken to flick-scroll the screen, and the manner in which it is done is less than impressive.

Tarzan is an excellent arcade adventure which together with games such as Antiriad, show the way for software companies to go. Even if the game was boring the Rob Hubbard music would justify the price, however it isn't, so how can you lose? **F.J.**

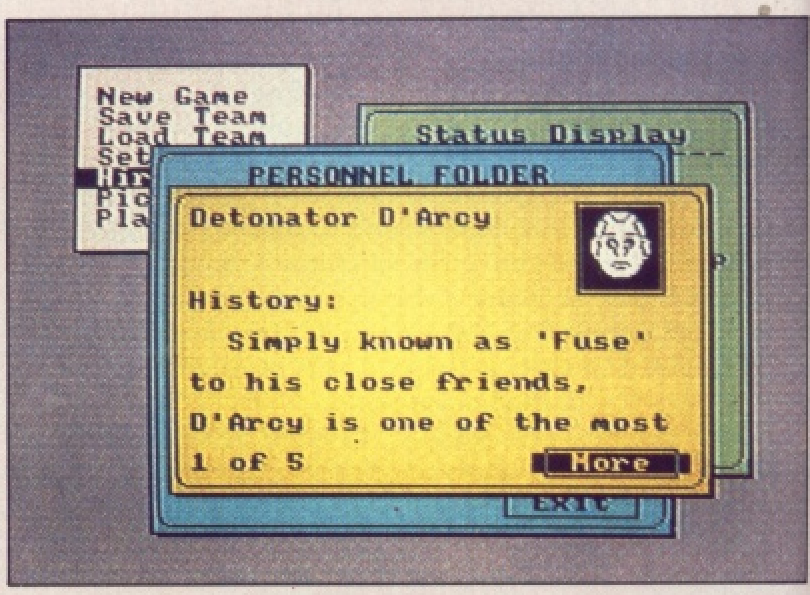
Touchline

Title: *Tarzan.* ***Supplier:*** *Martech, Martech House, Bay Terrace, Pevensey Bay, E Sussex. BN24 6EE.* ***Tel:*** *0323 76616.* ***Machine:*** *C64.* ***Price:*** *£9.95.*
Originality: *8/10.* ***Graphics:*** *7/10.* ***Playability:*** *7/10.* ***Value:*** *8/10.*

THEY STOLE A MILLION

*E*ver wanted to plan the perfect crime from the comfort of your living room? Now you can using the S.W.A.G. (SoftWare for Aspiring Criminals) disk available through "What Crime" magazine.

This database of hoodlums for hire, targets to be robbed



and fences to sell the goods allows you to plan and execute enough jobs for you to rise from small time crook to Mr Big.

Using window menus you can buy information and blueprints of your chosen target and select your team to do the job. Characters such as Charlie Volt and Detonator D'Arcy have specialist skills that can be hired for a fee and usually a cut of the profits so you should shop around to find the right team.

Using the blueprint and a simple set of icons you can plan every step of the raid from disabling alarms to blowing the safe.

During the raid the Boss usually is the lookout (it's safer) and must freeze the action if a police patrol comes into view.

Success will lead you on to bigger and better jobs until you tackle a top security bank as you go for the million.

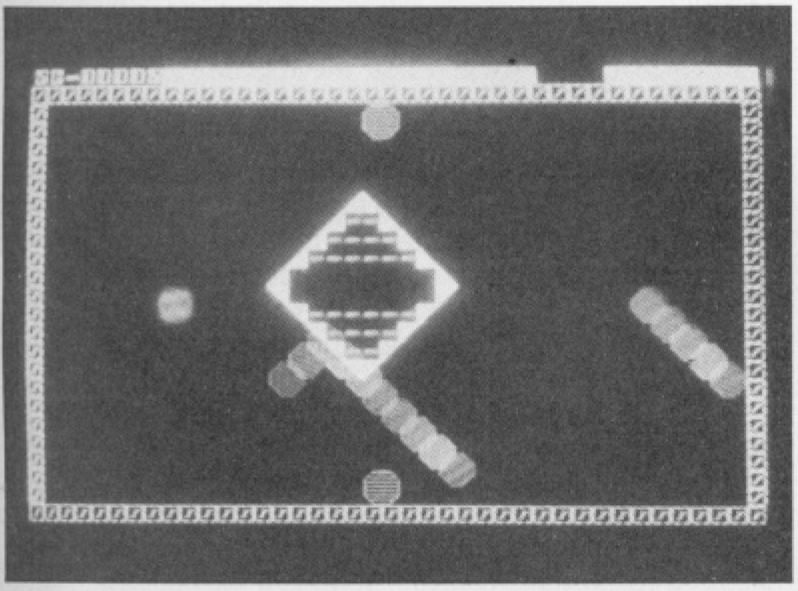
T.H.

Touchline

Title: They Stole a Million. ***Supplier:*** *Ariolasoft, 68 Long Acre, London WC2E 9JH.* ***Machine:*** *C64.* ***Price:*** *£9.95.*
Originality: *8/10.* ***Graphics:*** *4/10.* ***Playability:*** *7/10.* ***Value:*** *7/10.*

STARBURST

The C16 boom seems to have slowed down slightly, and with it, the number of really good games. One of the few games that really made the best of the little Commodore's graphics and colour was an offering from Ariolasoft, called Hyperforce, and programmed by Tony Takoushi.



Therefore, when the latest Ariola/Takoushi offering was released, I was eager to get my grubby little hands on to the joystick and put it through its paces. Hmmm, if first impressions count, then this game failed to impress me. It seemed to me that the author had tried to cover up for the games obvious roots by overcomplicating the gameplay, something that has seen many people fall flat on their faces.

Only after a few hours play did I start to find myself hooked, although why I was hooked I'm not totally sure. Starburst is basically a breakout derivative with some new touches and added gameplay. In order to keep the game interesting for more than a few minutes, there are three different levels, all of which take some time to master.

The first level involves blasting at two balls at the top and bottom of the screen until they have been hit so many times that they become 'active'. Your ship then stops firing and turns into a large pong type bat, with which you must guide these two balls into their respective home slots. The moral of this screen is speed, as the faster it is completed, the more points are built up. If this level sounds too easy, there are some rogue balls to complicate it, and if you fail to achieve the objective before the two active guages run out, then you must start a completely new game (no lives on this level!).

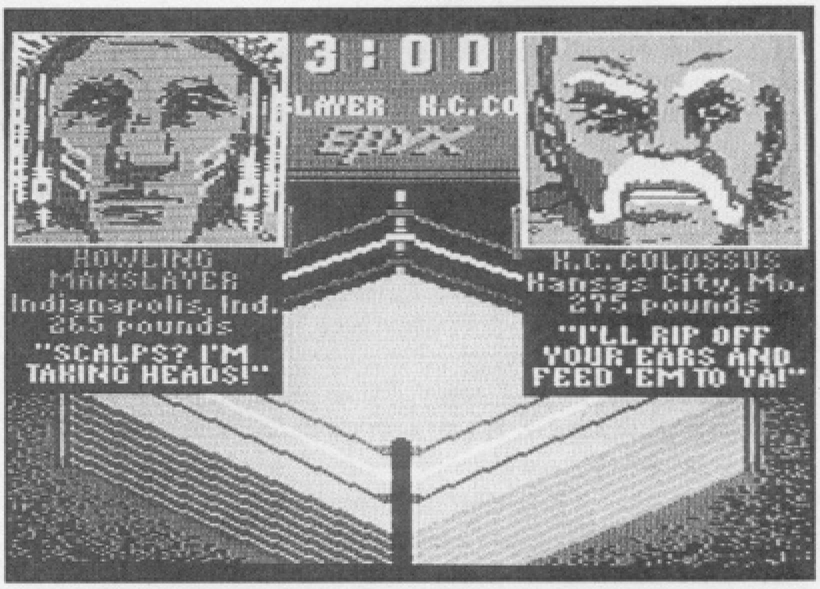
If you successfully complete level one, you are thrown into a bonus level, and it is here that points come free and easy, until time runs out. Level two involves blasting through a force field, from either the bottom or the top of the screen. As the forcefield shrinks, a number of coloured balls appear, and must be avoided at all costs, and at one point it gets so bad that there are eight balls flying around at breakneck speeds! As with level one, completion leads to a bonus level, which lasts as long as the amount of gauge time you have remaining.

Level three ought to be the most difficult, but it isn't! All you need to do is round up the Plastron Boulders by shooting them. Points are flying around here, with 500 available every time you complete the game. Reminiscent in many ways of an early Minter game, Starburst, at £2.99, represents excellent value for money, and should not be missed by any C16/Plus 4 owner looking for a challenge.

F.J.

Touchline

Title: Starburst. ***Supplier:*** *Ariolasoft, 68 Long Acre, Covent Garden, London WC2E 9JH.* ***Tel:*** *01 836 3411.* ***Machine:*** *C16/Plus 4.* ***Price:*** *£2.99.*
Originality: *9/10.* ***Graphics:*** *6/10.* ***Playability:*** *7/10.* ***Value:*** *7/10.*



CHAMPIONSHIP WRESTLING

Over the past couple of years, one company above all others has stood out when it comes to sport simulations. That company is Epyx. Once again they have proved their

worth with Championship Wrestling. In general I am not a great sports fan. However, where computers are concerned, I feel that sports programs offer a fine medium of entertainment.

Basically the objective in Championship Wrestling, is to get rid of all opposition and become the Champion wrestler. As in most Epyx games, the more people that partake in the festivities the better. On loading up you are asked if you want to either practice, compete or see world records.

Obviously, to start with you choose the practice option. This allows you to get acquainted with all the various moves and joystick positions that are required. (I would suggest you get plenty of practice before doing battle with someone else.)

In the competition mode, if you are playing alone, you select a wrestler and then play each of the seven others in turn. With more than one player, each player will be asked to choose a wrestler. The computer then organises the matches and battle begins.

When playing in competitions, judicious selection of who you want to be is crucial. Each wrestler has his own style and strong points. Also each has one specialised move that none of the others have. So once again practice is recommended to discover each wrestlers effectiveness. (This move is known as the custom move.)

Overall, there are some 30 moves possible that each wrestler can perform. Unfortunately, there is not enough space here to go into each one in detail. Basically they are in eight groups: close to opponent, far from opponent, custom move, headlock, lift, airplane spin, opponent on mat and walking around ring. The use of certain moves depends upon your previous move. For example to give your opponent an airplane spin you need to be lifting him in the air. To be able to lift him, you need to have him in a headlock. To get him into a headlock you have to be close in. It's this interaction of moves that makes the game that much more enjoyable.

There are one or two nice touches within the program. For instance, if you take your time the crowd will boo and hiss and wave banners. Throw your opponent out of the ring and the crowd go wild. All in all, this is a nicely presented game that with practice is quite playable and fun.

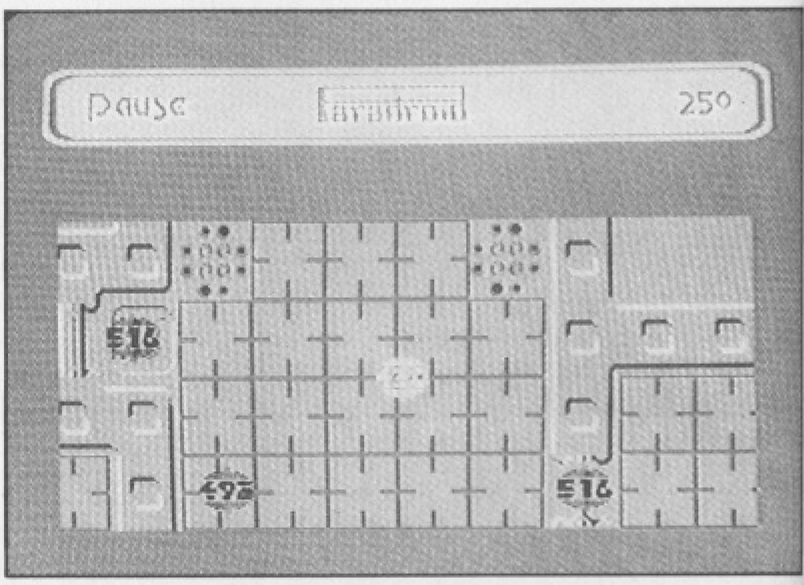
Touchline

Title: *Championship Wrestling.* ***Supplier:*** *US Gold, Units 2/3 Holford Way, Holford, Birmingham, B6 7AX.* ***Price:*** *£9.95.* ***Originality:*** *7/10.* ***Graphics:*** *7/10.* ***Playability:*** *8/10.* ***Value:*** *8/10.*

PARADROID

For those of you that missed them first time round, Hewson has re-released two very popular '86 hits. Paradroid and Uridium, both programmed by Andy Braybrook. Paradroid is the same as before, except that it is much faster, whilst Uridium has lots of new ship designs. So what do you have to do?

Paradroid is simple, you are ordered to destroy a mutinous crew of Droids that have taken over a galactic freighter. To aid you in your task, you are issued with a 'Droid Influence' device. With this device you can take over and control Droids. (You can also simply blast them out of their existence). The droids are scattered around the ship, which is made up of several decks. Obviously, things are not that easy. The droids are made up of varying power



strengths. The higher the droid number the better it is. Once you destroy all droids on one deck, the deck computer shuts down, and therefore all lights go out. In other words the deck goes dark. One word of caution here. Do not think that it is simply a matter of blasting everything in sight on each level. There is a lot more strategy involved. My only real tip for you is proceed slowly.

Next question is, what weaponry have I? The influence device is fitted with low power twin lasers. The droids also have twin low power lasers. However as the droid number becomes higher, then its firepower increases. Two types of battle droids have disurpters, these you have to take over, you cannot shoot them. Transferring to droid is quite involved, but most of the strategy is applied to this part of the game. Decide which droid you wish to take over, stop and centre the joystick. Press the fire button and hold it down, then ram the chosen droid. The screen will now change to what ressembles a circuit diagram. The idea being to control the rectangular blocks by having your colour represented inside the block. You gain control of a block by moving your pulsars up or down, then pressing the fire button at the required place. If after the time limit you have more of the blocks coloured in your colour transfer is complete. The higher the droid number, the more pulsars are made available to it.

To move around the different decks, find one of the lifts and press the button whilst you are standing on it. You may view decks, the whole ship, or droid capabilities by standing in front of one of the deck consoles that are scattered around.

I fairly enjoyed Paradroid the first time, but now that it has been made slightly faster in play, it becomes even more enjoyable.

Touchline

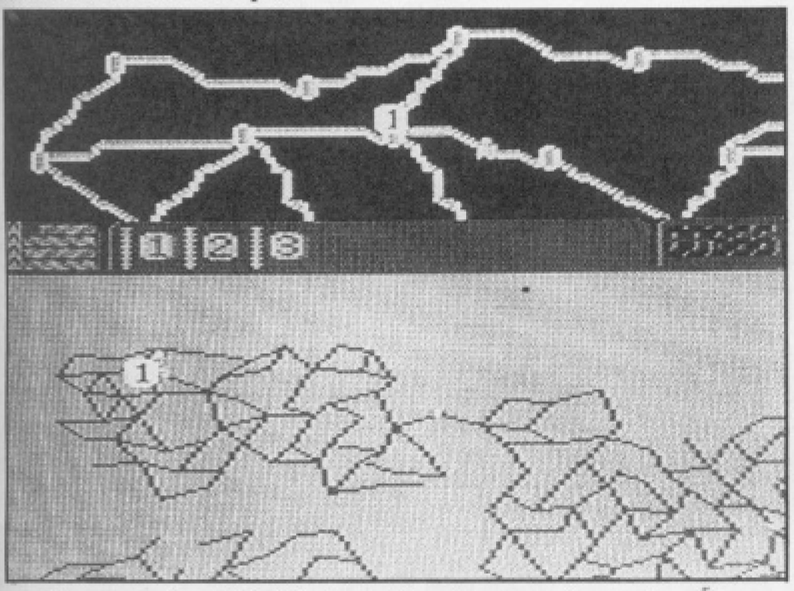
Title: *Paradroid.* ***Suppier:*** *Hewson, Hewson House, 56B Milton Trading Estate, Milton, Abingdon, Oxon. OX14 4RX.* ***Machine:*** *C64.* ***Price:*** *£9.95 with Uridium.*
Originality: *8/10.* ***Graphics:*** *8/10.* ***Playability:*** *9/10.* ***Value:*** *9/10.*

TRACKER

As Chandos, leader of an unscrupulous group of space pirates and mercenaries, you have been given a tough assignment. The centrepoint complex on the planet of Zeugma IV has gone beserk. The computer that controls all facets of life on this plant of pleasure, has decided that it no longer needs human controllers. No problem, just switch it off! Wrong. This computer has a few tricks up its sleeve — if computers have sleeves — to stop you pulling the plug.

Not least of these are the Cycloid patrol craft, over which it has total control. These craft patrol the trackways that surround the computer complex, destroying anything in their path. this can be a prroblem if you are on the trackway at the time. Therefore, to aid you in your mission, you have been equipped with the best ships that Caliban can provide. To reach the computer centre it is necessary for you, along with a maximum of seven other ships, to traverse the trackways knocking out communication centres and the cycloids.

Your ships are equipped with ion bombs, and forward firing lasers to accomplish this task. The bombs have very short fuses, so do not hang about too long. The C.P. complex consists of 22 interconnecting sectors, each with its own communication centre. You are initially beamed down to three 'Safe Sectors', and can on knocking out a centre, beam down additional ships.



The game itself is displayed in three sections. At the top of the screen is a scrolling map centred on the current ship being controlled. Any enemy forces are also displayed on this screen. Half way down the screen is the status window. Shown here are the current conditions of all eight ships. Also shield status and whether they are under attack or not. On the left of this window, is a more informative display of your current ship in use. Along with this, there is an audience rating, a sort of score which continuously counts down. The better you do, the more points you clock up. Beneath this is where most of the action takes place.

This screen has two functions. Firstly, it displays one of four maps, of varying scales. These are selected via the function keys. Alternatively, a 3D view through the cockpit can be called up. This is where all combat takes place. This screen is used when dropping bombs on Comms centres, and when destroying the computer itself.

This game comes well packaged, with a short novelette, to get you into the right mood. It is a good attempt at an original game. The game itself is a very cunning and strategically orientated game, with undertones of the Star Wars trench sequences. At £17.95 this may be a little pricey for some people, but if you can afford it, you could do a lot worse than purchase this program.

Touchline

Title: *Tracker.* ***Supplier:*** *Rainbird Software, Wellington House, Upper Street, Martins Lane, London WC2H 9DL.* ***Price:*** *£17.95.* ***Machine:*** *C64.*
Originality: *8/10.* ***Graphics:*** *8/10.* ***Playability:*** *9/10.* ***Value:*** *7/10.*

URIDIUM

The second of Hewson's re-releases is Uridium. Fans of the game will only need to be told that this is the same as before but with some new superb ships. For those of you that are new to this game let me expand.

The solar system is under attack from metal seeking ships, known as Super-dreadnoughts. These ships seek out and drain precious metal ores from the planets within your sector. Your task is to destroy the dreadnoughts before they exhaust all the different ores. Firstly, you must destroy its defensives both on the surface of the ship, and those that fly around in attack groups. Control is by the joystick and is as follows. Up and down control your height above the ships surface. Left and right control your direction. Avoid structures on the ships surface that cast shadows, this means that they are high up. The dreadnoughts fighter defences deploy in waves, so be prepared for some nifty flying.

On the ship, the small coloured squares that flash, are silos for the homing mines. These can be fairly easily avoided if they appear singly. Destroy as many of the surface defences as you can, whilst avoiding the fighters. Keep flying right, and be on the look out for a landing strip. Once the 'LAND NOW' signal is seen, land your craft as quickly as possible. The surface fighters become very intelligent at this point.

On safely landing, you are then presented with the bonus screen. It is up to you to gain as many points as possible, before flying over the dreadnought for the final strafe run. I have to be honest, and say that normally, I am not into shoot and blast em type of games. My forte being text only Infocom. However, when Uridium first came out, I must confess I could not stop playing it. There is something about this program that puts it in the same class as Boulderdash 1, 2 and 3. I am pleased to say that this re-release lives up to its predecessor. The new dreadnought designs are done really well. And quite a few of them will have you pulling your hair ouit. The designs are in the same Bas relief as before, with one or two extra characters re-defined.

Touchline

Title: *Uridium.* ***Supplier:*** *Hewson, Heweson House, 56b Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX.* ***Machine:*** *C64.* ***Price:*** *£9.95 with Paradroid.*
Originality: *7/10.* ***Graphics:*** *8/10.* ***Playability:*** *9/10.* ***Value:*** *9/10.*

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Nine Line Matrix

This C128 utility will make your 80 column display a lot clearer and it's short and easy to use.

By A. Millett

Quite a while back, Commodore brought out the 4000 series Pets. Like their predecessors and the subsequent Commodore range, they suffered from ROMs (called 'Basic 4.0') that were incompatible with all the other Commodores. This caused many programmers like myself the unnecessary pain of wading through and modifying our programs, and many others the bigger pain of having to lash out large amounts for new Basic 4.0 compatible goodies (that, I believe, was the point of the exercise).

That aside, one nice little feature this machine possessed was a vertically-spaced mode, with an extra raster line between each line of text on the screen. This routine will allow C128 users to do this in 80 column mode!

Operation

Operating the program is pretty self-explanator. Just load and run it, use cursor up and down to centralise the screen, and hit RETURN. You can now continue to use the 80 column screen as normal with other column programs, and the screen will remain in vertically-spaced mode until the machine is switched off.

Note that I have used high line-numbers so that you may incorporate the program into your own programs. To do so, change the END statement in line 39590 to RETURN and call the routine at the beginning of your own program with GOSUB 39000.

If you are interested with experimenting with the 80 column chip, you will find the SYS's I have used very interesting. Even though the SYS REED command (yes, that's REED!) is unused in this particular program, I have left the variable and some REM's in so that you may experiment with reading the 80 column registers.

I hope you find this routine as useful as I have. The tops of those 't's don't touch the bottom of those 'y's any more!

```
PROGRAM: 9 LINE MATRIX

39000 REM" 9 BY 8 MATRIX FOR
80 COLUMNS ON THE C128
39020 REM"           BY [s A]D
RIAN [s M]ILLETT
39040 REM
39060 :
39070 BANK 15
39080 WRITE=52684:REM" [s U]S
E SYS WRITE,DATA,REG    TO SE
T 80 COLUMN CHIP REGIS
TER
39090 REED=52698 :REM" [s U]S
E SYS REED,0,REG:RREG DATA
TO READ REGISTER.
39095 :             :REM"  YES,
THAT WAS REED, NOT READ!
39100 SYS WRITE,8,9 :REM" [s
R]ASTER LINES PER CHARACTER
39120 SYS WRITE,25,6:REM" [s
N]O. OF LINES DISPLAYED
39140 SYS WRITE,7,23:REM" [s
N]O. OF RASTER LINES IN CHAR.
 DISPLAYED.
39160 SYS WRITE,35,4:REM" [s
A]BSOLUTE NO. OF LINES.
39180 SYS WRITE,30,7:REM" [s
V]ERTICAL POSITION OF TOP OF
SCREEN.
39200 :
39210 SYS 27500,,0:SYS 27500,
,5:REM" [s E]QUIVALENT OF GRA
PHIC 0:GRAPHIC 5
39215 :     REM" [s S]PECIAL M
ETHOD FOR BASIC-128 COMPILER:
- USES 8K LESS MEMORY!
39220 PRINT CHR$(142);"[CLEAR
][s O]";SPC(77);"[s P]";
39240 CHAR 1,0,24,"[s L]"
39260 CHAR 1,78,24,"[s @]":RE
M" [s S]HIFT-@  CHARACTER
39280 CHAR 1,22,9,""
39300 PRINT CHR$(14);"[s U]SE
 CURSOR UP/DOWN TO MOVE DISPL
AY,
39330 PRINT SPC(27);"[DOWN][D
OWN][s H]IT [s R][s E][s T][s
 U][s R][s N] WHEN REA
DY."
39340 KVP=30
39350 SYS WRITE,KVP,7:REM" [s
 V]ERTICAL POSITION OF TOP OF
 SCREEN.
39360 DO:GET KA$
39380 LOOP UNTIL INSTR("[DOWN
][UP]"+CHR$(13),KA$)
39400 IF KA$="[UP]" THEN KVP=
KVP+1:GOTO 39350
39420 IF KA$="[DOWN]" THEN KV
P=KVP-1:GOTO 39350
39500 PRINT"[CLEAR]";
39590 END:REM" [s U]SE RETURN
 IF SUBROUTINE
39599 :
```

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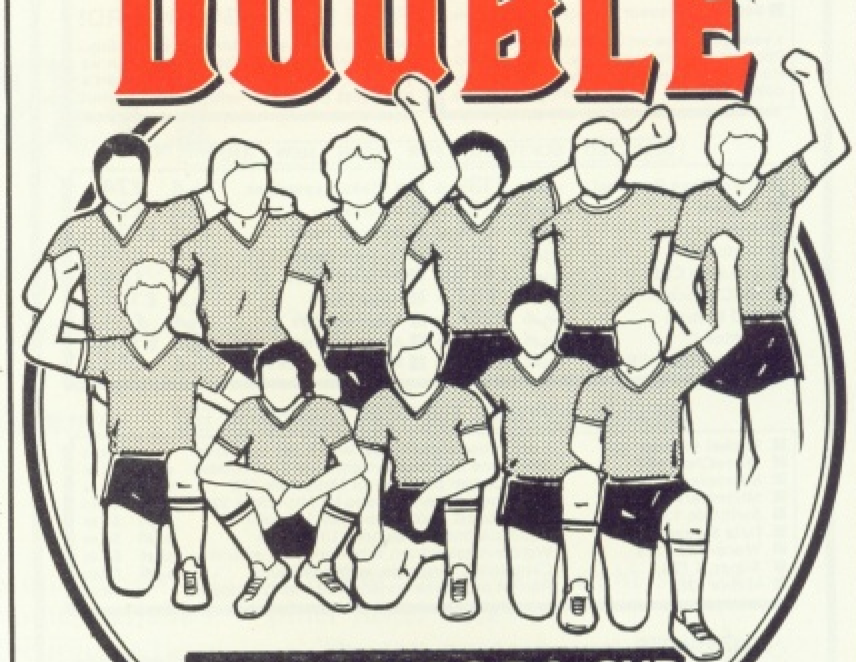
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Joystick Read

Here's a time saving and invaluable joystick routine for Basic programmers in league with a C64.

By Nick Sumner

How many sleepless nights have you spent wishing that there was an easier way to read the Commodore's joystick ports through Basic. One that was much faster and easier to understand. Well, funnily enough, here is that routine! Read on to find out more.

In Use

This Joystick utility has been designed to help those who are Basic programmers, but who want to add that professional touch to there programs. Using this routine for a joystick in Port 2 could just do that!

The actual routine is on an interrupt and so doesn't waste Basic's time for GOSUBS etc.

Two Basic string variables are used to store the joystick information, so no PEEKing is needed either!

However there are a few things that you will need to know before you can run the routine, so read on!

Because the routine uses two string variables, these need to be set up by the programmer, before any other variables are defined or the machine code routine is called. This is what to do!

In your program:

```
10 JO$="    ":FIRE$="OFF":SYS
52736
```

JO$ and FIRE$ must be set like this either at the first line or in a subroutine, BUT, they must be in that order, and before any other variables.

Next, do not call the routine twice within your program or the computer may crash or BASIC may be corrupted!

For all m/c enthusiasts, there is a disassembly included. The interrupt routine shown can be used for smooth scrolling, more than eight sprites or other raster tricks.

The test program included allows you to move a white block around the screen with the joystick, and the fire button will make the border colour change (well, it's only a demo!).

I hope you enjoy using this routine in your own programs.

```
JOYSTICK ROUTINE DISASSEMBLY

   1 AGENDA   =  $CFFF
   2 COUNT1   =  $CFFE
  99 *=$CE00
1000          SEI           !  SET INTERRUPT DISABLE STATUS
1010          LDA #$00      !  CLEAR CIA CONTROL REGISTER A
1020          STA $DC0E
1030          LDA #$1B
1040          STA $D011     !  CLEAR MSB FOR RASTER
1041          LDA #$80
1042          STA $D012     !  SET RASTER POSITION
1050          LDA #<RT
1055          STA $0314     !  CHANGE JUMP LOCATION
1060          LDA #>RT
1070          STA $0315
1300          LDA #$01
1320          STA $D01A     !  SET FOR IRQ COMPARE
1321          LDY #$03      !  FIND JO$ CO-ORDINATES
1322          LDA ($2D),Y
1324          STA $FB
1326          INY
1328          LDA ($2D),Y
1330          STA $FC
1332          LDY #$0A      !  FIND FIRE$ CO-ORDINATES
1334          LDA ($2D),Y
1336          STA $FD
1338          INY
1340          LDA ($2D),Y
1342          STA $FE
1350          LDA #$55      !  PLACE ASCII 'U' INTO MEMORY
1352          STA $CF10
1354          LDA #$44      !  PLACE ASCII 'D' INTO MEMORY
1356          STA $CF11
1358          LDA #$4C      !  PLACE ASCII 'L' INTO MEMORY
1360          STA $CF12
```

```
1362            LDA #$52        !   PLACE ASCII 'R' INTO MEMORY
1364            STA $CF13
1480            CLI             !   CLEAR INTERRUPT DISABLE STATUS
1490            RTS             !   RETURN TO BASIC
1500 RT         LDA #$01        !   CHECK FOR INTERRUPT OCCURING
1505            BIT $D019
1510            BNE BEGIN
1512            JMP $EA31       !  JUMP TO SYSTEM ROUTINES
1515 BEGIN      LDA #$01        !   SET REGISTERS FOR WORK
1519            LDY #$00
1520            STA COUNT1
1521            LDX #$00
1523            LDA #$20
1524            STA ($FB),Y     !   CLEAR JO$
1525 LOOP1      LDA $DC00       !   READ JOYSTICK
1530            AND COUNT1      !   GET ONE DIRECTION
1535            BNE NEXT        !   IF NOT USED GO ON
1540            LDA $CF10,X     !   GET ASCII VALUE
1545            STA ($FB),Y     !   STORE IN JO$
1550            JMP FIRE        !   GOTO FIRE BUTTON CHECK
1565 NEXT       ASL COUNT1      !   DOUBLE COUNT1
1570            INX
1575            CPX #$04        !   ALL DIRECTIONS CHECKED?
1580            BNE LOOP1
1581 FIRE       LDY #$09        !   SET FIRE$ TO 'OFF'
1582            LDA #$03        !   (SET STRING LENGTH TO 3)
1583            STA ($2D),Y
1584            LDY #$01
1588            LDA #$46
1589            STA ($FD),Y
1590            INY
1591            STA ($FD),Y
1592            LDA $DC00       !  READ JOYSTICK
1593            AND #$10        !  GET FIRE BUTTON
1594            BNE STOP        !  IF NOT PRESSED THE GOTO STOP
1595            LDY #$09        !  CHANGE FIRE$ TO 'ON'
1596            LDA #$02        !  (CHANGE LENGTH OF FIRE$ TO 2)
1597            STA ($2D),Y
1598            LDY #$01
1599            LDA #$4E
1600            STA ($FD),Y
1612 STOP       LDA #$80        !  SET NEW RASTER POSITION
1613            STA $D012
1614            LDA #$1B
1615            STA $D011
1616            LDA #$01      . !  RESET INTERUPT FLAG
1617            STA $D019
1620            JMP $EA31       !  JMP TO SYSTEM ROUTINES
```

PROGRAM: JOYSTICK ROUTINE LOADER

```
1D  10 REM ********************
B4  15 REM *                  *
39  20 REM * JOYSTICK ROUTINE *
C6  25 REM *                  *
03  30 REM *  BY NICK SUMNER  *
50  35 REM *                  *
22  40 REM *     30/8/86      *
52  45 REM *                  *
95  50 REM ********************

76  100 POKE53281,0:PRINTCHR$(147
    )CHR$(5)"[SPC7]**** JOYSTICK
    ROUTINE ****"
53  110 PRINT:PRINT"LOADING IN DA
    TA NOW..."
5C  250 MC=52736:RL=0:LN=500
2B  260 SC=0:FORI=0TO7:READD
91  270 IFD<0GOTO340
D8  280 IFD>255GOTO330
C0  290 POKEMC+RL,D:SC=SC+D:RL=RL
    +1:NEXTI
FA  300 READD:IFD<0THEN340
3B  310 IFSC=DTHENLN=LN+10:GOTO26
    0
0A  320 PRINT:PRINT"?SUMCHECK ";
32  330 PRINT"ERROR IN LINE";LN:E
    ND
D8  340 READD:IFSC<>DGOTO320
41  350 PRINT:PRINTSPC(8)"LOADED"
83  360 PRINT:PRINT"TO USE:"
85  370 PRINT:PRINT"SYS 52736"
0C  375 PRINT"DON'T FORGET TO DEF
    INE 'JO$' AND 'FIRE$'BEFORE A
    NY OTHER VARIABLES."
2A  380 PRINT:PRINT"WHEN USING JO
    $:"
6B  382 PRINT"U=UP, D=DOWN, L=LEF
    T, R=RIGHT."
93  384 PRINT:PRINT"WHEN USING FI
    RE$:"
60  386 PRINT"ON=FIRE ON, OFF=FIR
    E OFF."
3B  388 PRINT:PRINT"HIT ANY KEY T
    O CONTINUE."
C7  390 POKE198,0:WAIT198,1
E8  392 PRINTCHR$(154)CHR$(147):P
    OKE53281,6
0C  395 END
45  500 DATA 120,169,0,141,14,220
    ,169,27,860
DC  510 DATA 141,17,208,169,128,1
    41,18,208,1030
53  520 DATA 169,75,141,20,3,169,
    206,141,924
69  530 DATA 21,3,169,1,141,26,20
```

```
    8,160,729
B2  540 DATA 3,177,45,133,251,200
    ,177,45,1031
3F  550 DATA 133,252,160,10,177,4
    5,133,253,1163
93  560 DATA 200,177,45,133,254,1
    69,85,141,1204
9A  570 DATA 16,207,169,68,141,17
    ,207,169,994
3E  580 DATA 76,141,18,207,169,82
    ,141,19,853
B2  590 DATA 207,88,96,169,1,44,2
    5,208,838
FC  600 DATA 208,3,76,49,234,169,
    1,160,900
B9  610 DATA 0,141,254,207,162,0,
    169,32,965
BE  620 DATA 145,251,173,0,220,45
    ,254,207,1295
A2  630 DATA 208,8,189,16,207,145
    ,251,76,1100
92  640 DATA 122,206,14,254,207,2
    32,224,4,1263
7F  650 DATA 208,232,160,9,169,3,
    145,45,971
E9  660 DATA 160,1,169,70,145,253
    ,200,145,1143
73  670 DATA 253,173,0,220,41,16,
    208,12,923
C8  680 DATA 160,9,169,2,145,45,1
    60,1,691
93  690 DATA 169,78,145,253,169,1
    28,141,18,1101
8A  700 DATA 208,169,27,141,17,20
    8,169,1,940
66  710 DATA 141,25,208,76,49,23
    4,-1,733
```

PROGRAM: TEST ROUTINE

```
8E  1 REM
7B  2 REM *** JOYSTICK TEST. ***
8C  3 REM
79  4 REM *** BY NICK SUMNER ***
8A  5 REM
0C  6 REM ***    30/8/86     ***
88  7 REM
91  10 JO$=" ":FIRE$="OFF":SYS527
    36
84  11 REM
42  12 REM *^* SET JO$ & FIRE$ FI
    RST *^*
82  13 REM
35  20 A=0:B=0:X=0:Y=0:Z=0:PRINTC
    HR$(147)
91  30 IFJO$="U"ANDY>0THENY=Y-1:G
    OSUB100
47  40 IFJO$="D"ANDY<24THENY=Y+1:
    GOSUB100
37  50 IFJO$="L"ANDX>0THENX=X-1:G
    OSUB100
02  60 IFJO$="R"ANDX<39THENX=X+1:
    GOSUB100
3A  70 IFFIRE$="ON"THENGOSUB200
3C  80 GOTO30
EB  100 REM
07  110 REM *** MOVE BLOCK ***
F7  120 REM
40  130 POKE55296+A+B*40,14
B2  140 POKE1024+X+Y*40,160
0E  150 POKE55296+X+Y*40,1
A0  160 A=X:B=Y
24  170 RETURN
47  200 REM
97  210 REM *** CHANGE BORDER ***

53  220 REM
EF  230 Z=Z+1
89  240 Z=ZAND255
61  250 POKE53280,Z
8B  260 RETURN
```

Hard Copy

One of the biggest investments which a computer user makes is inevitably a printer. For this reason we've put a new Citizen model through its paces.

By Mycroftt Appleby

The Citizen *LSP-10* printer is one of the low end price bracket printers that is making Citizen a very big name in the peripherals world at the moment.

It's easy to see why Citizen has come so far so fast. The *LSP-10* is a full width printer with all the facilities found on the more expensive Epsons along with NLQ and tractor/friction feed options. Externally, the machine is a lot smaller than its immediate opposition, its dimensions being 385mm wide, 255mm deep, and 90mm high. The control buttons comprise the usual on/off line, line feed, and form feed. With indicators for power, paper out, and ready. The current trend towards setting the print options (ie. bold, italics, NLQ etc.) from the front panel is not supported here, which is a shame – but this is a low cost printer.

Paper and Print

The paper advance knob is well mounted on the right of the machine immediately above the interface connector. Having the interface on the side of a printer is most unusual as most printers have them on the back. But when you think about it, the side is a most logical place to attach cables as they then don't foul the paper feed. The power cable does attach at the back, but it at one corner and has a 90 degree bend on it to make the cable emerge sideways.

The printer comes as standard with friction feed, but a tractor option is available. This feeds the paper in very easily and is one of the most trouble free paper feeds that I have come across. The friction feed can also be supplemented by a sheet feeder that can feed correspondence quality paper to compliment the NLQ print. Paper loading is trouble free to an extent that I hadn't thought existed after using the Epson method of loading paper. When there is no paper in the machine, the form feed button doubles as an auto paper load button that takes the paper from the back of the machine to in front of the print head.

Print speed varies between 24 characters per second in NLQ mode and 120 cps when printing draft. The draft output isn't bad, but obviously isn't as good as you would expect for a printer whose main selling point is that ability. With the *LSP-10* it is more of a bonus. The NLQ in this case should be considered as just an easier to read matrix font, you wouldn't write a letter to your bank manager with it.

Interfacing

As is becoming common nowadays the interface is on a cartridge. The one I had was a centronics parallel type, but I believe a Commodore serial one is available. The cartridge is flush fitting and is shaped in the same way as the bottom of the case. Unless you know that it is there, you wouldn't ever suspect it. A well thought out point with the cartridge is that the dip switches are on it. These are the switches that set up the different start up options and functions on the printer. Usually you have to scrape around the inside of the printer or even open up the case with a screwdriver. But with the *LSP-10* you can remove the cigarette packet sized unit and have it in front of you whilst you consult the manual.

The dip switches in this printer are more important than in most as they set the emulation mode of the machine. The printer is capable of emulating the popular (i.e. around 60% of the market) Epson range of printers to a greater or lesser degree. This means that if you ever have screen-dump software for example, you may find that it has an Epson option on it. One of the three Citizen emulation modes should suffice. It can also emulate the less popular, but business standard, IBM graphics printer. But as you don't often find these on Commodores, you probably won't ever need it.

Documentation

The manual is a sturdy tome, in a spiral binding that lays flat (very useful). The concept and features of the printer are introduced in a logical manner with worked examples, sample outputs, and diagrams. At the end of the manual there is a tear off card with all the more common escape codes indicated. This saves a lot of time as I usually have to dredge through the manual, making it extremely dog-eared, to extract the relevant information.

All the escape codes and functions are based around the common Epson standard with the usual bold, double strike, compressed, expanded, italic, or correspondence quality styles supported. The graphics capability is also good with three graphics densities up to around 1920 dots on an eight inch line. There is also two speeds for the medium density print to improve quality at the cost of reducing speed. You can also define your own characters on the 11×9 print format if you discard the 2K printer buffer.

Verdict

Overall I can safely say that having used the printer on regular basis for the last month, that I am extremely happy with it. It provides most of the facilities of the most popular printer in the world, with none of the little idiosynchrasies that get the name of Epson cursed over, and at a much more reasonable price. Definitely the top of my list for printers at the moment. YC

Labeller 64

Let your C64 take the hassle out of printing name and address labels. Your C64, a printer, some address labels and this program are all that you need.

By A.J. Lenton

How often have you had to type the address of a friend on to an envelope? Or perhaps you have a list of people that you need to send letters to quite often. *Labeller 64* will take the hassle out of this by keeping a record of the names and addresses that you use most often and printing a selection of them out at your command.

This is the second part of the *Labeller 64* program which was started in the *February 1987* issue of *Your Commodore*.

To enter this section of the program you should LOAD in the data you already have into the *Hex Data Entry* program and use the 'Enter Data' option to continue.

PROGRAM: LABELLER

```
41E1 45 4E 20 4F 52 20 07 F1 :70
41E9 D0 52 49 4E 54 45 52 20 :EF
41F1 28 D3 2F D0 29 D0 EC DC :8C
41F9 61 46 01 50 01 9C F5 46 :B8
4201 01 53 01 9C F7 8D D4 04 :27
4209 D1 0A 5A 46 01 53 01 9D :F9
4211 D4 04 D1 7D 58 46 01 93 :4E
4219 D0 46 1A C5 4E 54 45 52 :C7
4221 20 C4 45 56 49 43 45 20 :D1
4229 CE 55 4D 42 45 52 20 03 :CC
4231 F1 34 9D 03 F1 D0 B3 D7 :9E
4239 FF 26 FD 26 C5 FF 12 9E :53
4241 FE 12 8C F5 52 09 FE 12 :2C
4249 8B F7 8F D4 16 52 17 EA :09
4251 46 07 91 20 06 F1 D0 EC :AB
4259 46 01 91 D0 D1 2C 5A 46 :56
4261 1F 11 C5 4E 54 45 52 20 :A8
4269 D3 45 43 4F 4E 44 41 52 :3F
4271 59 20 C1 44 44 52 45 53 :17
4279 53 20 03 F1 37 9D 03 F1 :36
4281 D0 B3 D7 FF 27 FD 27 C5 :21
4289 FF 13 9E FE 13 8C F5 52 :69
4291 09 FE 13 8B F7 8F D4 14 :93
4299 52 1B EA 46 09 91 20 06 :99
42A1 F1 91 91 D0 EC D1 75 5A :2B
42A9 46 0C 11 C4 4F 20 59 4F :7B
42B1 55 20 57 41 4E 54 D0 EC :DC
42B9 46 0E 11 12 1F CD 92 1E :EC
42C1 41 4E 55 41 4C 20 4F 52 :95
42C9 D0 EC 46 15 11 1F 12 C1 :2B
42D1 92 1E 55 54 4F 20 50 41 :70
42D9 50 45 52 20 46 45 45 44 :27
42E1 20 D0 EC 46 12 11 C5 4E :0F
42E9 54 45 52 20 27 CD 27 20 :DE
42F1 4F 52 20 27 C1 27 20 D0 :EE
42F9 EC DC FF 14 46 01 4D FE :58
4301 14 9C F5 46 01 41 FE 14 :60
4309 9C F7 8D D4 04 D1 12 5B :D9
4311 46 21 1F 11 CE 55 4D 42 :68
4319 45 52 20 4F 46 20 4C 49 :17
4321 4E 45 53 20 54 4F 20 42 :DF
4329 45 20 50 52 49 4E 54 45 :9A
4331 44 20 20 D0 28 CF EC 52 :FA
4339 1E EA 46 01 91 D0 B3 D7 :52
4341 FF 28 FD 28 C5 FF 15 8A :DC
4349 FE 15 8C F5 28 FE 15 8B :8F
4351 F7 8F D4 15 52 20 EA 46 :25
4359 0A 91 20 07 F1 91 91 D0 :92
4361 EC D1 29 5B 46 00 7A 46 :B9
4369 38 11 C1 52 45 20 59 4F :4D
4371 55 20 55 53 49 4E 47 20 :82
4379 12 1F D3 92 1E 49 4E 47 :2F
4381 4C 45 20 4F 52 20 1F 12 :B5
4389 C4 92 1E 4F 55 42 4C 45 :77
4391 20 50 41 50 45 52 20 04 :98
4399 F1 28 D3 2F C4 29 20 3F :B0
43A1 D0 EC DC 7A 46 01 53 1A :3D
43A9 9C F5 46 01 44 1A 9C F7 :F0
43B1 8D D4 04 D1 C0 5B 46 01 :09
43B9 53 1A 9D D4 04 D1 2B 5C :6D
43C1 46 24 11 CE 55 4D 42 45 :26
43C9 52 20 4F 46 20 C3 48 41 :91
43D1 52 41 43 54 45 52 53 20 :47
43D9 C2 45 54 57 45 45 4E 20 :95
43E1 CC 41 42 45 4C 53 D0 EC :86
43E9 46 01 11 D0 B3 D7 FF 04 :45
43F1 FD 04 C5 FF 02 9E FE 02 :00
43F9 8C D4 13 46 0B 91 20 08 :3A
4401 F1 91 91 D0 EC D1 06 5C :92
4409 46 1F 11 CE 55 4D 42 45 :64
4411 52 20 4F 46 20 CC 49 4E :7E
4419 45 53 20 C2 45 54 57 45 :45
4421 45 4E 20 CC 41 42 45 4C :A5
4429 53 D0 EC 46 01 11 D0 B3 :AA
4431 D7 FF 04 FD 04 C5 FF 16 :60
4439 9E FE 16 8C D4 13 46 0B :1C
4441 91 20 08 F1 91 91 D0 EC :38
4449 D1 4E 5C 8A F5 FD 12 F5 :CE
4451 FD 13 AF 9E 0B 94 D4 04 :93
4459 52 03 65 8A 05 94 D4 05 :8C
4461 8A 0B 81 72 52 02 05 94 :B4
4469 D4 05 8A 03 81 72 52 03 :77
4471 05 94 D4 13 8A 03 81 72 :40
4479 23 CB 9E CD 00 28 FC 76 :C3
4481 3F 20 A0 20 F8 D5 9E 6B :DF
4489 32 CB 9E CD 00 28 52 02 :9C
4491 05 94 F5 FC 76 3F 2B 9F :79
4499 00 94 F7 8D D4 0C 8A 0B :63
44A1 82 6B 8A 00 82 60 D1 B6 :C7
44A9 5C 46 01 53 1A 9D D4 07 :13
44B1 20 FF 00 D1 06 5D 52 02 :AC
44B9 05 94 D4 08 20 FF 00 8A :6B
44C1 00 82 60 52 02 05 94 F5 :08
44C9 FC 76 3F 2B 9F 00 94 F7 :F8
44D1 8D D4 0C 8A 0B 82 6B 8A :D1
44D9 00 82 60 D1 EB 5C FD 15 :92
44E1 C8 8A CD 38 28 52 C5 C2 :2D
44E9 55 3C 94 D4 04 D1 F0 5D :33
44F1 52 02 05 93 D4 04 D1 6B :EC
44F9 5D 8A E5 FC 9C 2A FD 00 :FB
4501 07 A1 D0 E9 46 01 53 1A :D6
4509 9D F5 FC 9C 2A 20 07 A1 :BE
4511 4F 00 9D F7 8F D4 08 8A :5D
4519 E5 EC E9 D1 C9 5D 32 00 :4D
4521 8B D4 08 8A E5 EC E9 D1 :7B
4529 C9 5D 8A E5 FC 9C 2A FD :7F
4531 00 07 A1 C3 FE 02 81 09 :FE
4539 82 E7 20 07 A1 D0 EC E9 :C5
4541 D1 C9 5D 8A E5 FC 76 3F :75
4549 20 9F FC 9C 2A 07 A1 D0 :ED
4551 E9 46 01 53 1A 9D F5 8A :47
4559 00 82 FC 76 3F 9F FC 9C :E1
4561 2A 07 A1 4F 00 9D F7 8F :9E
4569 D4 08 8A E5 EC E9 D1 C9 :8F
4571 5D 8A 00 82 12 8C D4 08 :97
4579 8A E5 EC E9 D1 C9 5D 8A :DA
```

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4581 E5 FC 76 3F 20 9F FC 9C :D9
4589 2A 07 A1 C3 FE 02 81 09 :80
4591 82 E7 8A 00 82 FC 76 3F :22
4599 9F FC 9C 2A 07 A1 D0 EC :A4
45A1 E9 AC 28 38 46 01 53 1A :B2
45A9 9D D4 04 D1 E0 5D 52 02 :19
45B1 05 93 D4 05 8A 00 82 60 :AB
45B9 46 01 4D FE 14 9C D4 04 :D7
45C1 D1 86 5E 52 02 F5 29 CE :56
45C9 46 01 11 D0 20 CF 46 3D :CF
45D1 C4 4F 20 D9 4F 55 20 D7 :17
45D9 49 53 48 20 D4 4F 20 D2 :8D
45E1 45 50 4F 53 49 54 49 4F :DA
45E9 4E 20 D0 41 50 45 52 20 :56
45F1 4F 52 20 06 F1 D3 54 4F :C6
45F9 50 20 D0 52 49 4E 54 49 :15
4601 4E 47 20 28 D2 2F D3 29 :1D
4609 20 3F D0 EC DC 61 46 01 :4A
4611 52 01 9C F5 46 01 53 01 :BD
4619 9C F7 8D D4 04 D1 37 5E :04
4621 46 01 53 01 9D D4 04 D1 :12
4629 9E 5E 46 1E 11 1D D0 4F :F7
4631 53 49 54 49 4F 4E 20 D0 :F4
4639 41 50 45 52 20 41 4E 44 :98
4641 20 D0 52 45 53 53 20 27 :B3
4649 D2 27 D0 EC DC 61 46 01 :0C
4651 52 01 9C D4 04 D1 77 5E :F3
4659 D1 9B 5E 9E FE 16 94 D4 :17
4661 04 D1 9B 5E FD 16 CB 8A :A1
4669 CD 38 28 8A E5 EC E9 D5 :4D
4671 AC 28 00 8A B1 52 02 F5 :AB
4679 29 CE D8 23 CB 9E CD 00 :97
4681 28 FC 76 3F 20 A0 9E F8 :70
4689 D5 46 17 93 81 C4 4F 20 :C0
4691 59 4F 55 20 57 49 53 48 :F4
4699 20 54 4F 20 53 45 4C 45 :46
46A1 43 54 D0 EC 46 1D 11 31 :86
46A9 29 20 1F C1 44 44 52 45 :C4
46B1 53 53 45 53 20 54 4F 20 :85
46B9 42 45 20 D0 D2 C9 CE D4 :36
46C1 C5 C4 81 D0 EC 46 1D 11 :63
46C9 32 29 20 1F C1 44 44 52 :F1
46D1 45 53 53 45 53 20 54 4F :EB
46D9 20 42 45 20 CF CD C9 D4 :C3
46E1 D4 C5 C4 81 D0 EC 46 13 :A8
46E9 11 33 29 20 1F D4 4F 54 :B6
46F1 41 4C 20 D0 52 49 4E 54 :7B
46F9 4F 55 54 D0 EC 46 00 FF :65
4701 01 46 1B 11 1E C5 4E 54 :1B
4709 45 52 20 D3 45 4C 45 43 :B9
4711 54 49 4F 4E 20 D2 45 51 :12
4719 55 49 52 45 44 20 D0 B3 :65
4721 D7 FF 01 FD 01 C5 65 8A :A2
4729 05 93 F5 52 02 05 93 F7 :5F
4731 8D F5 52 03 05 93 F7 8D :5D
4739 D4 19 46 01 91 D0 52 1B :DF
4741 EA 46 05 20 05 F1 D0 EC :14
4749 46 02 91 91 D0 D1 28 5F :8F
4751 52 03 05 94 D4 12 23 CB :E4
4759 9E CD 00 28 FC 76 3F 20 :99
4761 A0 20 F8 D5 D1 CF 59 9E :CA
4769 6B 23 F5 52 14 CC 9E CD :26
4771 00 28 46 01 93 D0 52 13 :2B
4779 CB 9E CD 38 28 20 07 82 :8F
4781 55 0A 8B D4 05 46 01 1D :86
4789 D0 46 01 1F D0 20 07 82 :74
4791 CF 46 01 1E D0 20 07 82 :77
4799 FC 9C 2A 55 01 A1 F5 52 :AC
47A1 23 F7 DD D0 EC 27 00 82 :1E
47A9 F5 8A 03 81 F7 94 D4 04 :F5
47B1 D1 E3 5F AC 28 38 46 23 :2E
47B9 11 96 C5 4E 54 45 52 20 :FC
47C1 4E 55 4D 42 45 52 53 20 :31
47C9 53 45 4C 45 43 54 45 44 :E7
47D1 20 4F 4E 45 20 42 59 20 :27
47D9 4F 4E 45 D0 EC 46 25 C5 :3D
47E1 4E 54 45 52 20 27 C3 27 :04
47E9 20 54 4F 20 C3 4F 4E 54 :88
47F1 49 4E 55 45 20 4F 52 20 :A0
47F9 27 D0 27 20 54 4F 20 D0 :92
4801 52 49 4E 54 D0 EC B3 D7 :53
4809 FF 17 46 01 50 FE 17 9D :18
4811 D4 04 D1 CF 59 46 01 43 :1B
4819 FE 17 9D D4 04 D1 83 60 :FA
4821 FD 17 C5 FF 1D 23 FE 1D :D3
4829 95 D4 04 D1 67 60 FC 76 :8C
4831 3F 28 A0 FD 1D F8 8A 0B :18
4839 82 6B 46 01 91 D0 46 0D :6D
4841 20 0D F1 D0 EC 46 01 91 :5C
4849 D0 D1 33 60 AC 28 00 46 :4F
4851 17 11 96 C5 4E 54 45 52 :50
4859 20 27 C3 27 20 54 4F 20 :6C
4861 C3 4F 4E 54 49 4E 55 45 :B7
4869 D0 DC 61 46 01 43 01 9C :A9
4871 D4 04 D1 A0 60 D1 CF 59 :76
4879 46 22 13 9A 0E 08 1D 0D :4C
4881 F1 11 03 F1 2A 0E F1 D0 :9D
4889 EC 46 1B 20 0D F1 2A 20 :DE
4891 CC C1 C2 C5 CC C5 D2 20 :90
4899 36 34 20 2A D0 EC 46 1B :98
48A1 20 0D F1 2A 0E F1 D0 EC :51
48A9 46 28 13 11 07 F1 1D 05 :7D
48B1 F1 D4 48 45 20 50 52 4F :6B
48B9 47 52 41 4D 20 48 41 53 :49
48C1 20 42 45 45 4E 20 53 45 :FA
48C9 54 20 57 49 54 48 3A D0 :EF
48D1 EC 46 1E 11 1D 05 F1 37 :E4
48D9 20 4C 49 4E 45 53 20 4F :46
48E1 46 20 33 35 20 43 48 41 :05
48E9 52 41 43 54 45 52 53 D0 :DF
48F1 EC 52 FB F5 52 04 CE 43 :B1
48F9 90 D0 00 04 F1 7F 40 F8 :67
4901 07 F5 52 0D CE 52 27 1F :16
4909 82 F5 9E CE 3F F5 9E CE :41
4911 40 A7 02 FF 06 FD 06 F5 :7E
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5749 00 0F 00 00 0F D0 0F 00 :FA
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5759 0F D0 4F 00 03 E1 0F 00 :B2
5761 FF 00 0F F0 00 FF 00 FF :3E
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5779 FF 00 FF 00 FF 00 FF 00 :68
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5791 00 F0 FF 00 FF 00 FF 00 :61
5799 FF 00 FF 00 FF 00 FF 00 :88
57A1 0F FF 00 FF 00 FF 00 FF :9B
57A9 00 FF 00 FF 00 FF 00 FF :94
57B1 FF 00 FF 00 DF 00 FF 00 :00
57B9 FF 00 FF 00 FF 00 FF 00 :A8
57C1 4F FF 00 FF 00 FF 00 00 :03
57C9 DF 10 00 FF 00 FF 00 FF :B5
57D1 FF 00 FF 00 FF 00 FF 00 :C0
57D9 FF 00 FF 00 FF 00 0F F0 :B8
57E1 F0 FF 00 FF 00 FF 00 FF :BC
57E9 00 FF 00 DF F0 FF 03 FF :19
57F1 FF 00 FF 00 FF 00 FF 00 :E0
57F9 FF 00 FF 00 FF 00 FF 00 :E8
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5819 FF 00 04 FE F0 F0 0F 00 :D4
5821 F0 FF FF 08 0F F0 00 FF :0E
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5831 F0 00 0F F0 F0 0F FF 40 :10
5839 0F FF F0 FF 00 0F FF F0 :E4
5841 00 FF 60 F0 0F FF F0 FF :EB
5849 FF F0 2F F0 FF 06 E1 F0 :3A
5851 0F FF 00 00 E0 F0 0F B0 :46
5859 FF 03 E1 F0 FF 00 FF F0 :34
5861 0F FF 00 FF 00 FF 00 FF :5B
5869 00 FF 00 FF 00 0F 00 00 :BC
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5881 00 FF 00 FF 00 FF 00 FF :6C
5889 00 FF 00 FF 00 FF 0F 00 :E5
5891 FF 00 FF 00 FF 00 FF 00 :80
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58A1 00 FF 00 FF 00 FF 00 FF :8C
58A9 00 FF 00 FF 00 00 FF 00 :9B
58B1 FF 00 FF 00 FF 00 FF 00 :A0
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58C9 00 FF 00 FF 00 00 FF 00 :BB
58D1 FF 00 FF 00 FF 00 FF 00 :C0
58D9 FF 00 FF F0 0F 0F 00 FF :31
58E1 00 FF 00 FF 00 FF 00 FF :CC
58E9 00 0F 00 FC 00 00 FF 00 :EF
58F1 FF 00 FF 00 FF 00 FF 00 :E0
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5919 01 0F 0F F0 F7 F0 FD FF :7A
5921 00 0F F0 00 FF F0 0F 0F :8A
5929 F0 0F F0 F0 0F F0 00 0F :29
5931 F0 F0 0F FF 80 0F FF F0 :7C
5939 FF 00 0F FF F0 00 FF 90 :89
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5949 F0 FF 06 E1 F0 0F FF 00 :CF
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5971 00 FF 00 FF 00 FF 00 FF :5C
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59A9 FF 00 00 FF 00 FF 00 FF :95
59B1 00 FF 00 FF 00 FF 00 FF :9C
59B9 00 FF F0 00 FF 00 FF 00 :7A
59C1 FF CF 00 0F FF 00 FF 00 :8D
59C9 FF 00 00 FF 00 FF 00 FF :B5
59D1 00 FF 00 FF 00 FF 00 FF :BC
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59E9 FC 00 00 FF 00 FF 00 FF :D2
59F1 00 FF 00 FF 00 FF 00 FF :DC
59F9 00 FF FF 20 FF 00 FF 00 :67
5A01 FF 00 FF 00 0F 00 03 E1 :64
5A09 F0 00 00 FF F0 FF 0C FF :EA
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5A19 F0 F1 0F 00 00 FF F0 0F :19
5A21 FF 00 0F F0 F0 0F F0 0F :1E
5A29 0F F0 0F FF F0 0F 0F F0 :33
5A31 00 FF F0 00 0F 00 FF F0 :C2
5A39 00 0F FF 00 FF 0F F0 00 :38
5A41 0F C0 00 0F 30 0F 00 06 :85
5A49 E1 0F F0 00 FF FF 0F 0F :ED
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5AC9 00 FF 00 FF 00 FF 00 FF :B4
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5AD9 FF 00 FF 00 FF 00 FF 00 :C8
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5AE9 00 FF 00 FF 00 FF 00 FF :D4
5AF1 00 FF 00 FF 00 FF 00 00 :E4
5AF9 CF 00 FF 00 FF 00 FF 00 :B8
5B01 FF F0 FF 03 E1 0F DF FF :B8
5B09 00 0F 00 F3 00 FF 00 FF :E4
5B11 00 0F FE F0 F0 0F 0C F0 :C6
5B19 FF FF 00 0F F0 00 FF F0 :7A
5B21 0F 0F F0 0F F0 F0 0F F0 :92
5B29 00 0F F0 F0 0F FF D0 0F :43
5B31 FF F0 FF 00 0F FF F0 00 :E1
5B39 FF D0 F0 0F FF F0 3F FF :2F
5B41 F0 DF F0 FF 06 E1 F0 0F :26
5B49 FF 00 00 F0 F0 DF 00 FF :E9
5B51 03 E1 F0 FF 00 FF F0 0F :E3
5B59 FF 00 FF 00 FF 00 FF 00 :48
5B61 FF 00 FF 00 0F 00 00 FF :9F
5B69 00 FF 00 FF 00 FF 00 FF :54
5B71 00 FF 00 FF 00 0F FF 00 :BD
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5B81 FF 00 FF 00 FF 0F 00 FF :C9
5B89 00 FF 00 FF 00 FF 00 FF :74
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5B99 FF 00 FF 00 FF 00 FF 00 :88
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5BA9 00 FF 00 FF 00 FF 00 FF :94
5BB1 00 FF 00 FF D0 00 FF 00 :B3
5BB9 FF 00 FF CF 00 1F FF 00 :A3
5BC1 FF 00 FF 00 00 FF 00 FF :AE
5BC9 00 FF 00 FF 00 FF 00 FF :B4
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5BD9 FF 00 FF 00 FF 00 FF 00 :C8
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5BE9 00 FF 00 FF 00 FF 00 FF :D4
5BF1 00 FF 00 FF FF 30 FF 00 :FE
5BF9 FF 00 FF 00 FF 00 0F 00 :58
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5C09 0C FF 00 FF 00 FF F0 01 :A0
5C11 0F 0F F0 F3 0F 00 00 FF :1C
5C19 F0 0F FF 00 0F F0 F0 0F :16
5C21 F0 0F 0F F0 0F FF F0 0F :68
5C29 0F F0 00 7F F0 00 0F 00 :2C
5C31 FF F0 00 0F FF 00 7F 0F :37
5C39 F0 00 0F C0 00 0F 10 0F :97
5C41 00 06 E1 0F F0 00 FF FF :CC
5C49 0F 0F 70 FF 00 03 E1 0F :72
5C51 00 FF 00 0F F0 00 FF 00 :33
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5C71 00 FF F0 00 FF 00 FF 00 :32
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5C81 FF 00 F0 FF 00 FF 00 FF :3D
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5CA9 00 FF 00 FF 00 FF 00 FF :94
5CB1 00 4F FF 00 FF 00 FF 00 :3F
5CB9 30 FF F0 00 FF 00 FF 00 :AA
5CC1 FF FF 00 FF 00 FF 00 FF :AB
5CC9 00 FF 00 FF 00 FF 00 0F :34
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5CF9 FF 00 FF F0 FF 03 E1 0F :60
5D01 DF FF 00 0F 00 F3 00 FF :C3
5D09 00 FF 00 0F FC F0 F0 0F :D6
5D11 08 F0 FD FF 00 0F F0 00 :D5
5D19 FF F0 0F 0F F0 0F F0 F0 :7A
5D21 0F F0 00 0F F0 F0 0F FF :FC
5D29 D0 0F FF F0 FF 00 0F FF :2F
5D31 F0 00 FF D0 F0 0F FF F0 :E0
5D39 0F FF F0 FF F0 FF 06 E1 :ED
5D41 F0 0F FF 00 00 F0 F0 FF :73
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5D61 00 FF 00 FF 00 FF 00 FF :4C
5D69 00 FF 00 FF 00 FF 00 0F :D4
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5D89 00 FF 00 FF 00 FF C0 00 :BC
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5DC9 00 FF 00 FF F0 0F 0F 00 :35
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5DE9 00 FF 00 FF 00 FF FF 30 :55
5DF1 FF 00 FF 00 FF 00 FF 20 :E0
5DF9 0F 00 03 E1 F0 20 00 FF :FC
5E01 F0 FF 0C FF 00 FF 00 FF :00
5E09 F0 03 0F 0F F0 FA 0F 01 :64
5E11 00 FF F0 0F FF 00 0F F0 :FE
5E19 F0 0F F0 0F 0F F0 0F FF :7E
5E21 F0 0F 0F F0 00 3F F0 00 :25
5E29 0F 00 FF F0 00 0F FF 00 :47
5E31 2F 0F F0 00 0F F0 00 0F :B0
5E39 00 0F 00 06 E1 0F F0 00 :BD
5E41 FF FF 0F 0F 00 FF 00 03 :B8
5E49 E1 0F 00 FF 00 0F FF 00 :96
5E51 FF 00 FF 00 FF 00 FF 00 :40
5E59 FF 00 FF F0 FF FF 00 FF :01
5E61 00 FF 00 FF 00 FF 00 FF :4C
5E69 00 FF 00 FF F0 00 FF 00 :0B
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5E79 FF 00 FF 00 F0 FF 00 FF :16
5E81 00 FF 00 FF 00 FF 00 FF :6C
5E89 00 FF 00 6F FF 00 FF 00 :36
5E91 FF 00 FF 00 FF 00 FF 00 :80
5E99 FF 00 FF FF 00 FF 00 FF :82
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5EA9 00 FF 00 2F FF 00 FF 00 :56
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5EC9 00 0F F0 F0 FF 00 FF 00 :6A
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5F29 0F FF F0 00 7F D0 F0 0F :68
5F31 FF F0 0F FF F0 FF F0 FF :6A
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5F99 00 FF 00 FF 00 FF 00 FF :B4
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6219 00 0F F0 00 0F 00 FF F0 :CA
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6229 0F F0 00 0F 00 0F 00 06 :DD
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6239 00 FF 00 03 E1 0F 00 FF :F9
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6479 20 60 A6 20 8E A6 A2 1F :DA
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6489 F7 A9 E1 4C 34 03 8D 0C :F5
6491 4D 8D AC 50 4C AE A7 11 :E4
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Hex Data Entry

Introducing the Your Commodore Hex Data Entry Program to make our listings even more accessible.

By M.C. Stretton assisted by P.A. Eves

The *Your Commodore* Hex Data Entry program has been written with you, the reader in mind. No longer will it be a painstaking ordeal, typing in all the long lists of data. This program will ensure a 100% correct entry, each and every time you use it.

I have made this version as streamlined as possible so as to save you having to type in a large program. There are only four options in this version: LOAD DATA; SAVE DATA; ENTER DATA; PRINT DATA. There will be a much larger version coming shortly which will give lost more options and will have Windows, Redefined Chars, Scrolling Text etc.

On first entering the Hex Data Entry, only the LOAD DATA and DATA ENTRY options are available to you. This is because the buffer is empty, and the other two options require data to be present. On selecting the LOAD DATA option, you are asked for TAPE or DISK. Press either 'T' or 'O' then RETURN. The program remembers that last input/output, and so it is possible to just hit RETURN if the correct device type is being displayed. You are then required to enter a filename.

Tape users please note, to cut down on errors for disk users, you will not be allowed to enter a blank filename. Filenames can be a combination of any characters, except graphics, up to 16 in number. If you should make an error in your filename entry, you may either delete single characters by the DEL key, or SHIFT/CLRHOME will delete the whole filename. Be extremely careful when typing in your filename, errors can be fatal, so make sure you only use filenames that are stored on whatever device you are using. After the prompt, hit return and the file will be loaded into the buffer. The program will allow files up to 95 blocks in length to be loaded in. If you want larger programs entered, you will have to split them into two or more parts first. After the load, control is passes back to the main menu.

The save option is identical to the load, except that it takes the contents of the buffer and saves them out to the given start address. This will save an executable file, that can be loaded and run, independant of the Input program.

Data Entry

The Data Entry option is the option by which you can enter data from *Your Commodore*, or your own creations. Once this option is selected you are asked if you want to continue from the given address. If you have just 'LOADed' a file, this address will be the next available byte in the buffer. (Allowing you to add more data to the end of the loaded file). This is also true of the program currently in memory. Therefore if you wish to continue typing in at the last address, type 'Y'. If 'N' is pressed the program assumes you are starting a fresh entry. When this happens the buffer is reset to zero, thus losing any program currently in memory. (I have chosen $C000 as the normal start up address purely because most M/C progs reside here.) After pressing 'N', you are then asked for the starting address, in Hex. Any valid Hex number is acceptable, e.g. $400, $C00, $0400. In this example, the first figure, $400, would be interpreted as $0400 by the program. Likewise $286 is taken to be $0286.

Once the start address is given, you are asked if you want checksums or not. If you are typing in a program from *Your Commodore* your response will be 'Y'. If you are entering your own program then select 'N'.

The screen display now changes to show the current address being poked into. Type any valid Hex number and the program automatically skips the next byte without the need to type commas, spaces or returns. If you make a mistake, one press of the DEL key will erase the whole number. If in the no checksum mode, when you get to the end of the line, the line will automatically scroll up ready for your next input.

If in checksum mode, after eight bytes are entered you must type the two digit checksum at the end of the line. Unlike the no checksum mode you now press return to enter the line.

If the program finds that the checksum does not match the line entered, a warning tone will be sound. You will then be asked if you wish to either: a) Re-enter the line or b) Re-enter the checksum.

After checking your line, if you fi you have entered it wrongly, then pre 'L'. The line will be erased and yo then re-enter it correctly. If you fin that you have only made a mistake i typing in the checksum, then press 'C and re-enter it. Should you wish t stop entering data, simply press retur or space bar on a blank line to get yo back ot the main menu. Here you ma save your program so as to resta another day, or you may wish to see printout.

On choosing the print option, yo have a choice or hard copy or scree copu. The listing can be paused at an time by pressing down and holdin down any key. Pressing th RUN/STOP key and holding it dow will breat out of the print mode an return you to the main menu.

The left arrow key 'top left of th keyboard', acts as zero when typing your data. The space bar acts as th return key when entering dats, thu leaving you free from searching for th return key.

The load option allows an program, less than 95 blocks, to b loaded into the buffer, so it is possib to load a basic program, obtain a He dump, then resave the program out another tape or disk without harmin it in any way.

I hope that this program will help take the drudgery out of typing in lon lists of date statements.

```
Please use SYNTAX CHECKER
when entering this program

EC  10 REM ------------- SETUP
    -------------
AF  20 POKE788,52:CLR
03  30 DV=8:BU=16384:POKE650,1
    :POKE53280,12:POKE53281,12
    OKE646,1:PRINT"[CLR,REV H,
    V SN]"
AA  35 REM SEE NOTES ON [REV T
    IN LISTINGS FOR DETAILS ON
    OW TO GET REV CHARACTERS
D6  40 CA$="$C000":CA=49152:SA
    A:TI=0
C8  50 GOSUB2180
5E  55 PRINT"[CLR]";
EF  60 REM ------------- OPTIONS
    -------------
0D  70 PRINT"[HOME,RVSOFF,BLACK
    C@40]";
7F  80 PRINT"[RVSON,BLACK] YOUR
    COMMODORE HEX INPUTTER - (C
     1986 ";
11  90 PRINT"[RVSON] -DESIGNED
```

```
ND WRITTEN BY M C STRETTON-
[RVSOFF]";
68 95 PRINT"[RVSON,SPC10]ASSISTED BY P A EVES[SPC10,RVSOFF]";
30 100 PRINT"[WHITE,DOWN6,RIGHT13][F1] LOAD DATA"
14 110 PRINT"[DOWN2,RIGHT13][F3] SAVE DATA"
08 120 PRINT"[DOWN2,RIGHT13][F5] DATA ENTRY"
5D 130 PRINT"[DOWN2,RIGHT13][F7] PRINTER"
05 140 GOSUB1250
9B 150 ONFKGOSUB1650,1770,180,860
50 160 GOTO70
23 170 REM ------------ HEX INPUT ---------
BA 180 GOSUB1970
DB 190 PRINT"[HOME,DOWN,BLACK,RVSON]CONTINUE FROM[SPC27,UP,RIGHT14]";CA$
F4 200 POKE198,0:WAIT198,1:GETA$
F9 210 IFA$="N"THENBU=16384:GOTO240
CE 220 IFA$="Y"THENPRINT"[WHITE]";:GOTO260
C1 230 GOTO200
EB 240 PRINT"[HOME,DOWN,BLACK,RVSON]DATA ADDRESS: $....[SPC21,UP,RIGHT15]";
B5 250 GOSUB1320:PRINT"[WHITE,RVSOFF]";:HH$=IN$:GOSUB1190:SA=DE:CA=DE:CA$=HH$
6A 260 PRINT"[HOME,DOWN,BLACK,RVSON,SPC4]DO YOU WISH TO ENTER CHECKSUMS?[SPC5,RVSOFF]";
2D 270 POKE198,0:WAIT198,1:GETA$
88 280 IFA$="N"THENZZ=1:GOTO310
C0 290 IFA$="Y"THENZZ=0:GOTO310
11 300 GOTO270
A5 310 PRINT"[CLR,WHITE]";
87 320 SYS59626
08 321 TT=0
68 325 GOSUB580
86 330 B=SA:KA=SA:IN$=""
40 340 GOSUB1250
BA 350 L=LEN(IN$)
77 360 IFA$=CHR$(20)THENGOSUB530:GOTO340
C3 370 IFA$=CHR$(13)ANDTN=0THENPRINT"[CLR]":RETURN
12 380 IFA$=CHR$(32)ANDTN=0THENPRINT"[CLR]":RETURN
30 390 IFA$="←"THENA$="0":GOTO430
53 400 Y=0:IFASC(A$)>47ANDASC(A$)<58THENY=1
66 410 IFASC(A$)>64ANDASC(A$)<71THENY=1
F1 420 IFY=0THEN340
37 430 PRINTA$;:DN=DN+1:IFDN=2THENPRINT" ";:GOTO450
18 440 IN$=IN$+A$:GOTO340
1E 450 IN$=IN$+A$
3E 460 HH$=IN$:GOSUB1190
A6 470 POKE BU,DE:CA=CA+1:BU=BU+1:DN=0:TN=TN+1:IN$=""
95 480 IFTN=8ANDZZ=1THENGOTO320
FB 490 IFTN=8ANDZZ=0THENPRINT"[RIGHT3]";:GOSUB720:GOSUB640
AD 500 IFTN=8ANDCH$=CK$THENGOTO320
01 510 IFTN=8ANDCH$<>CK$THENGOSUB2040:GOTO525
82 520 GOTO340
18 525 ONQQGOTO529,526
F9 526 PRINT"[HOME,WHITE,DOWN24,RIGHT37]";
AE 527 PRINT"..[LEFT5]";
26 528 GOTO490
E2 529 BU=BU-8:CA=CA-8:GOTO325
AD 530 IFTN=0THENGOSUB550:RETURN
A0 540 IFDN=0THENPRINT"[LEFT3]..[LEFT2]";:TN=TN-1:BU=BU-1:CA=CA-1:IN$="":RETURN
BF 550 IFL=>1THENIN$=LEFT$(IN$,L-1):PRINT"[LEFT].[LEFT]";:DN=DN-1
BC 560 RETURN
D7 570 REM ------------ NEWLINE ------------
93 580 IFBU<40951THEN585
14 581 GOSUB2560:PRINT"[HOME,DOWN,RVSON]WARNING: BUFFER ALMOST FULL-8 BYTES LEFT[WHITE]";
D7 582 FORA=1TO4000:NEXT:GOSUB2160
F9 585 DE=CA:GOSUB1110:CA$=LEFT$("$0000",5-LEN(HH$))+HH$
65 590 PRINT"[HOME,DOWN24,RIGHT,WHITE]";CA$;"[SPC4].. .. .. .. .. .. .. ..";
78 600 IFZZ=0THENPRINT"  : ..";
C6 610 PRINT"[HOME,DOWN24,RIGHT10]";:TN=0:DN=0:IN$="":RETURN
14 620 REM --------- CHEXUM ---------------
EB 640 CH=0
16 650 IFCA=SATHENRETURN
BD 660 FORX=1TO8:CH=CH+(X*(PEEK((BU-9)+X))):NEXT
26 665 CH=CH+CA-8
CE 670 CH=CH-INT(CH/256)*256:DE=CH:GOSUB1110:CH$=MID$(HH$,3)
30 680 IFCH$<>CK$THENTT=1
3A 690 RETURN
ED 710 REM ----------- GETCHECK -----------
61 720 POKE198,0:CK$=""
C3 730 GETL$:IFL$=""THEN730
41 740 L=LEN(CK$):IFL$=CHR$(20)ANDL>0THEN760
B7 750 GOTO770
72 760 CK$=LEFT$(CK$,L-1):PRINT"[LEFT].[LEFT]";:GOTO730
80 770 IFL$=CHR$(13)ANDL=2THENCK=VAL(CK$):RETURN
D2 780 IFL$=" "ANDL=2THENCK=VAL(CK$):RETURN
60 790 IFL$="←"THENL$="0"
1B 800 Y=0:IFASC(L$)>47ANDASC(L$)<58THENY=1
FO 810 IFASC(L$)>64ANDASC(L$)<71THENY=1
28 820 IFY=0ORL=2THEN730
3B 830 PRINTL$;
60 840 CK$=CK$+L$:GOTO730
B7 850 REM ---------- PRINTER ------------
C9 860 IFCA=SATHENRETURN
62 870 GOSUB1970:PRINT"[HOME,DOWN,RVSON,BLACK,SPC6]PRINT TO SCREEN OR PRINTER?[SPC7]"
A3 880 POKE198,0:WAIT198.1:GETK$
OE 885 IFK$=CHR$(136)THENPRINT"[WHITE,CLR]":RETURN
99 890 IFK$="S"THENNU=3:GOTO940
49 900 IFK$="P"THENNU=4
A1 910 IFK$<>"S"ANDK$<>"P"THEN880
E9 920 PRINT"[HOME,DOWN,BLACK,RVSON]  SWITCH ON PRINTER THEN PRESS RETURN[SPC3]"
E9 930 POKE198,0:WAIT198,1:GETA$:IFA$<>CHR$(13)THEN920
CD 940 OPEN3,NU:PRINT#3
11 950 PS=16384:PE=16384+(CA-SA):PC=PS:AS=SA:IFPE=PSTHEN1090
11 960 PRINT"[CLR]"
65 970 IFPEEK(197)=63THENPRINT"[WHITE,CLR]":AS=CA:GOTO1080
16 975 IFPEEK(203)<>64THEN970
20 980 DE=AS:GOSUB1110:CA$=LEFT$("0000",4-LEN(HH$))+HH$
82 990 CK=0:PRINT#3,"[SPC4]";CA$;
C9 1000 FORX=0TO7:Q=FRE(0)
38 1010 DE=PEEK(PC+X):GOSUB1110:B$=RIGHT$(HH$,2)
62 1020 PRINT#3," ";B$;:NEXTX
8A 1030 GOSUB1990
38 1040 PRINT#3," :"+CH$
8A 1050 PC=PC+8:AS=AS+8:KA=KA+8:KB=KB+8
B8 1060 IFPC<PETHENGOTO970
8A 1070 IFNU=3THENPOKE198,0:WAIT198,1
4E 1080 PRINT"[CLR]":DE=AS:GOSUB1110:CA$=LEFT$("$0000",5-LEN(HH$))+HH$
2B 1090 POKE198,0:PRINT#3:CLOSENU:PRINT"[CLR]":RETURN
1C 1100 REM -------- DEC-HEX ---------------
06 1110 A=INT(DE/256):B=DE-A*256:C=INT(A/16):D=A-16*C
3B 1120 C$=CHR$(48+C):IFC>9THENC$=CHR$(C+55)
0E 1130 D$=CHR$(48+D):IFD>9THEND$=CHR$(D+55)
FA 1140 E=INT(B/16):F=B-16*E
3F 1150 E$=CHR$(48+E):IFE>9THENE$=CHR$(E+55)
36 1160 F$=CHR$(48+F):IFF>9THENF$=CHR$(F+55)
EA 1170 HH$=C$+D$+E$+F$:RETURN
88 1180 REM ------------ HEX-DEC -----------
45 1190 IFLEN(HH$)<4THENHH$=LEFT$("0000"+HH$,4-LEN(HH$))+HH$
87 1200 A=ASC(HH$)-48:B=ASC(MID$(HH$,2,1))-48
34 1210 C=ASC(MID$(HH$,3,1))-48:D=ASC(MID$(HH$,4,1))-48
5D 1220 DE=256*(16*(A+7*(A>9))+B+7*(B>9))+16*(C+7*(C>9))+D+7*(D>9)
5C 1230 RETURN
AC 1240 REM ------------- F KEYS ----------
89 1250 FK=0
9C 1260 POKE198,0:WAIT198,1:GETA$
F2 1270 IFA$=CHR$(133)THENFK=1
A9 1280 IFA$=CHR$(134)THENFK=2
95 1290 IFA$=CHR$(135)THENFK=3
51 1300 IFA$=CHR$(136)THENFK=4
AD 1310 RETURN
E0 1320 REM ---------- GET ADDRESS --------
DA 1330 IN$=""
4A 1340 GETL$:IFL$=""THEN1340
```

```
27  1350 L=LEN(IN$):IFL$=CHR$(20
    )ANDL>OTHEN1370
46  1360 GOTO1380
B5  1370 IN$=LEFT$(IN$,L-1):PRIN
    T"[LEFT].[LEFT]";:GOTO1340
D1  1380 IFL$=CHR$(13)ANDL>OTHEN
    RETURN
49  1385 IFL$=CHR$(32)ANDL>OTHEN
    RETURN
3B  1390 FLAG=0:IFASC(L$)>47ANDA
    SC(L$)<58THENFLAG=1
63  1400 IFASC(L$)>64ANDASC(L$)<
    71THENFLAG=1
13  1410 IFFLAG<>1THENGOTO1340
38  1420 IFL=4THENGOTO1340
A5  1430 PRINTL$;
88  1440 IN$=IN$+L$:GOTO1340
A4  1450 REM ----------- FILENAME
     -----------
C0  1460 PRINT"[HOME,DOWN,RVSON,
    BLACK]FILENAME: [[SPC16]][SP
    C12,UP,RIGHT11]";
A7  1470 FL$=""
A5  1480 GETA$:IFA$=""THEN1480
41  1490 L=LEN(FL$)
E5  1500 IFA$=CHR$(20)ANDL>OTHEN
    1530
32  1510 IFA$="[CLR]"THEN1460
FD  1520 GOTO1550
1A  1530 FL$=LEFT$(FL$,L-1):PRIN
    T"[LEFT] [LEFT]";
88  1540 GOTO1480
9B  1550 IFA$=CHR$(13)ANDL>OTHEN
    1610
D8  1560 IFA$=CHR$(32)THEN1580
C3  1570 IFASC(A$)<32ORASC(A$)>9
    OTHEN1480
70  1580 IF L=16THEN1480
FD  1590 PRINTA$;
A7  1600 FL$=FL$+A$:GOTO1480
39  1610 FORX=1TOLEN(FL$):POKE83
    2+X,ASC(MID$(FL$,X,1)):NEXT
21  1620 POKE183,L
EA  1630 RETURN
6A  1640 REM ------------- LOAD -
    -------------
E7  1650 GOSUB1970:GOSUB1890:GOS
    UB1460
2C  1660 IFDV=1THENPRINT"[HOME,D
    OWN,BLACK,RVSON]  PLACE TAPE
     IN DECK THEN PRESS 'PLAY'
    [CS]":GOTO1720
23  1670 PRINT"[HOME,DOWN,BLACK,
    RVSON] PLACE DISK INTO DRIVE
     THEN HIT RETURN  [CS]"
F4  1680 POKE198,0:WAIT198,1:GET
    A$:IFA$<>CHR$(13)THEN1680
F5  1690 PRINT"[HOME,DOWN,BLACK,
    RVSON]LOADING[SPC33]"
1D  1700 PRINT"[RVSON,UP3,RIGHT8
    ]";FL$
EF  1710 SYS49244:GOTO1730
DD  1720 SYS49152
E5  1730 A=PEEK(829):B=PEEK(830)
    :C=PEEK(831):D=PEEK(832)
AB  1740 SA=(256*B)+A:CA=(256*D)
    +C:SZ=CA-SA:BU=BU+SZ
DF  1745 DE=CA-1:GOSUB1110:CA$=L
    EFT$("$0000",5-LEN(HH$))+HH$
52  1750 RETURN
47  1760 REM ------------ SAVE -
    -------------
12  1770 IFCA=SATHENRETURN
69  1780 GOSUB1970:GOSUB1890:GOS
    UB1460
76  1790 A=SA-INT(SA/256)*256:B=
    INT(SA/256):POKE829,A:POKE83
    0,B
FB  1795 C=CA-INT(CA/256)*256:D=
    INT(CA/256):POKE831,C:POKE83
    2,D
20  1797 IFDV<>1THEN1820
D1  1800 PRINT"[HOME,DOWN,BLACK,
    RVSON]PLACE TAPE IN DECK THE
    N PRESS 'REC-PLAY'[CS]":SYS4
    9203:SYS49206
97  1810 RETURN
1A  1820 PRINT"[HOME,DOWN,BLACK,
    RVSON] PLACE DISK INTO DRIVE
     THEN HIT RETURN  [CS]"
96  1830 POKE198,0:WAIT198,1:GET
    A$:IFA$<>CHR$(13)THEN1830
BC  1840 PRINT"[HOME,DOWN,BLACK,
    RVSON]SAVING[SPC34]"
6B  1850 PRINT"[RVSON,UP3,RIGHT7
    ]";FL$
8A  1860 SYS49343
DB  1870 RETURN
E1  1880 REM ----------- TAPE OR
    DISK -------
7D  1890 PRINT"[HOME,DOWN,BLACK,
    RVSON]TAPE OR DISK:[SPC27]";
88  1900 IFDV=1THENPRINT"[HOME,D
    OWN,RIGHT14]TAPE[SPC22]";
72  1910 IFDV=8THENPRINT"[HOME,D
    OWN,RIGHT14]DISK[SPC22]";
C5  1920 POKE198,0:WAIT198,1:GET
    A$
A9  1930 IFA$="T"ANDDV=8THENPRIN
    T"[HOME,DOWN,RIGHT14,RVSON]T
    APE":DV=1
56  1940 IFA$="D"ANDDV=1THENPRIN
    T"[HOME,DOWN,RIGHT14,RVSON]D
    ISK":DV=8
D8  1950 IFA$=CHR$(13)THENRETURN
D8  1955 IFA$=CHR$(32)THENRETURN
90  1960 GOTO1920
D5  1970 PRINT"[HOME]";:FORA=1TO
    4:PRINT"[SPC40]";:NEXT
9F  1980 REM ------- PRINT CHECK
    SUM ---------
D1  1990 CH=0:A=KB-8:FORX=1TO8
6E  2000 CH=CH+(X*(PEEK((PC-1)+X
    ))):NEXT
6D  2005 CH=CH+PC
A2  2010 CH=CH-INT(CH/256)*256
8E  2020 DE=CH:GOSUB1110:CH$=MID
    $(HH$,3):RETURN
E2  2030 REM ------- CHECKSUM ER
    ROR ---------
E0  2040 PRINT"[HOME,BLACK,RVSOF
    F,C@40]";
77  2050 PRINT"[RVSON]INPUT ERRO
    R - RE-ENTER [WHITE]L[BLACK]
    INE OR [WHITE]C[BLACK]HECKSU
    M ";
AF  2060 PRINT"[RVSOFF,CT40]"
16  2070 GOSUB2560
5F  2080 GETA$:IFA$=""THEN2080
C2  2090 IFA$="L"THENQQ=1
F6  2100 IFA$="C"THENQQ=2
13  2105 IFA$<>"C"ANDA$<>"L"THEN
    2080
D7  2160 PRINT"[HOME]";:FORA=1TO
    3:PRINT"[SPC40]";:NEXT
0C  2170 RETURN
B0  2180 I=49152
A9  2185 PRINT"[CLR,DOWN10,RIGHT
    7]PLEASE WAIT ONE MOMENT....
    "
A8  2186 PRINT"[HOME,DOWN11,RIGH
    T7,CT26]"
AA  2190 READ A:IF A=256 THEN RE
    TURN
EB  2200 POKE I,A:I=I+1:GOTO 219
    0
B4  2210 DATA 32,44,247,173,60,3
    ,133,255
9C  2220 DATA 169,0,133,193,169,
    64,133,194
1F  2230 DATA 56,173,63,3,237,61
    ,3,170
23  2240 DATA 173,64,3,237,62,3,
    168,24
4F  2250 DATA 138,101,193,133,17
    4,152,101,194
DC  2260 DATA 133,175,32,162,245
    ,165,255,141
65  2270 DATA 60,3,96,32,183,247
    ,169,0
DC  2280 DATA 133,193,169,64,133
    ,194,56,173
4A  2290 DATA 63,3,237,61,3,170,
    173,64
F6  2300 DATA 3,237,62,3,168,24,
    138,101
02  2310 DATA 193,133,174,152,10
    1,194,133,175
63  2320 DATA 32,124,246,96,169,
    96,133,185
CA  2330 DATA 169,1,141,60,3,133
    ,184,169
2D  2340 DATA 8,133,186,169,0,13
    3,195,133
0C  2350 DATA 147,169,65,133,187
    ,169,3,133
6C  2360 DATA 188,169,64,133,196
    ,164,183,32
04  2370 DATA 175,245,32,213,243
    ,165,186,32
C4  2380 DATA 9,237,165,185,32,1
    99,237,32
E9  2390 DATA 19,238,141,61,3,32
    ,19,238
23  2400 DATA 141,62,3,32,232,24
    4,165,174
E2  2410 DATA 141,63,3,56,165,17
    5,233,64
6C  2420 DATA 141,64,3,24,173,61
    ,3,109
6A  2430 DATA 63,3,141,63,3,173,
    62,3
B3  2440 DATA 109,64,3,141,64,3,
    96,169
0E  2450 DATA 97,133,185,169,1,1
    33,184,169
76  2460 DATA 8,133,186,169,65,1
    33,187,169
81  2470 DATA 3,133,188,165,185,
    164,183,32
3A  2480 DATA 213,243,32,143,246
    ,165,186,32
BC  2490 DATA 12,237,165,185,32,
    185,237,169
C8  2500 DATA 0,133,172,169,64,1
    33,173,56
C4  2510 DATA 173,63,3,237,61,3,
    133,174
21  2520 DATA 173,64,3,237,62,3,
    133,175
56  2530 DATA 24,169,64,101,175,
    133,175,173,61,3
1D  2540 DATA 32,221,237,173,62,
    3,160,0
B1  2550 DATA 32,33,246,96,256
22  2559 REM *********** SOUND **
    ***********
D4  2560 POKE 54296,15:POKE 5427
    7,0:POKE 54278,200
78  2570 POKE 54273,40:POKE 5427
    2,00:POKE 54276,17
25  2580 FOR T=1 TO 300:NEXT:POK
    E 54276,0:POKE 54277,0:POKE
    54278,0:RETURN
```

Superbowl Sunday

American football fans wake up. We bring you the chance to win a copy of the new Nexus football game.

In the aftermath of the actual Superbowl final between the New York Giants and the Denver Broncoes, we've decided to prolong the spirit of the occasion by running a special American football competition.

Nexus has recently released a new game to thrill fans, entitled *Superbowl Sunday*. Now C64 owners can experience the real excitement of a Superbowl final.

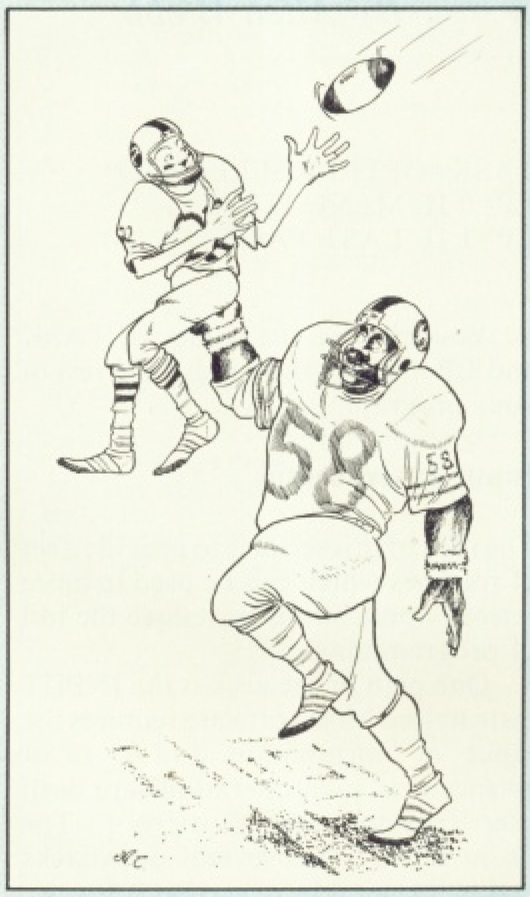
We have 30 copies of this C64 game to give away, so read on to find out how you can be the new keyboard refridgerator.

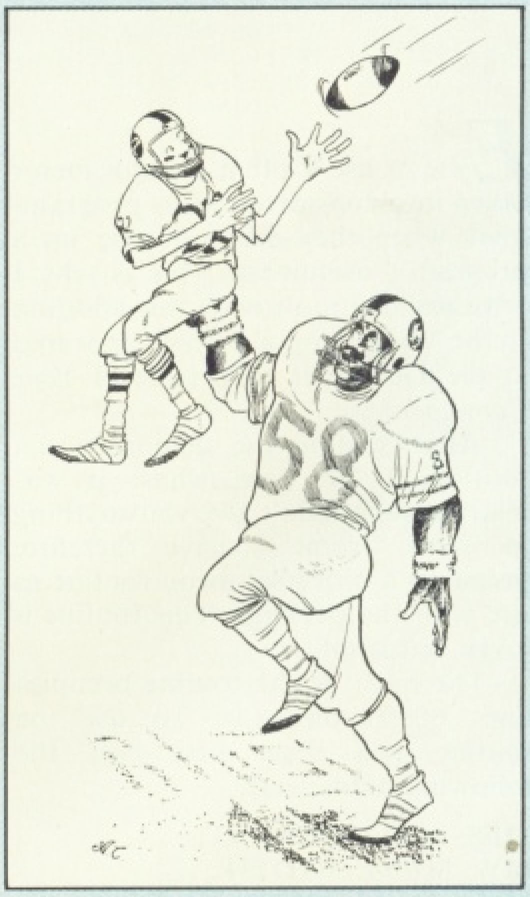
How to Enter

Study the two pictures on this page. There are several differences between them. Mark the differences which you can find and then fill in the coupon. Please write the number of differences which you have found on the back of your envelope, if you forget to do this, your entry will be void.

The Rules

Entries will not be accepted from employees of Argus Specialist Publications and Nexus. This restriction also applies to employee's families and agents of the company. The How to Enter section forms part of the rules. The editor's decision is final and no correspondence will be entered into.





Superbowl Competition Entry Coupon

Name ....
Address ....
....
....
postcode ....
Number of differences found ....

Send your entry to: Superbowl Competition, Your Commodore, 1 Golden Square, London W1R 3AB. Closing date Friday 27 March 1987.

WIMPS and Much More

For those of you who found our WIMP Program useful, here are a couple of additions to make it easier and more enjoyable.

By Allen Webb

Ease of use if often a major factor taken into consideration by programmers when they are summing up a program's usefulness. This is why I have decided to provide this addition to the Wimp program which appeared in the December 1986 issue of *Your Commodore*.

After writing the demonstration routine, I felt that, whilst it was instructive, it didn't give you anything to work from. I have therefore prepared a universal menu routine to use with the package. This routine is given in Listing 1.

The meat of the routine occupies lines 60000 onwards. To use the routine you must first pass the following prameters:

ME$: MENU STRING
MW: MENU WIDTH
MH: TOTAL MENU HEIGHT
XL: X COORDINATE TOP LEFT CORNER
YL: Y COORDINATE TOP LEFT CORNER+1
C1,C2: MENU COLOURS

The routine will then draw the menu and set up the pointer. The routine detects the movement of the pointer and highlights the menu options or "last page" icon when they are pointed t. The button press is detected if an option has been selected and the routine exits with the following information:

TASK=OPTION SELECTED
LP=0 IF MENU ITEM
LP=1 IF LAST PAGE

You can use the values of TASK and LP to direct the logic of the rest of your program.

Input Instructions

The idea of this series is to provide a set of routines which can be used in more serious applications to reduce the toil of programming.

One pain in the neck is the INPUT instruction. Most software requires the input of information and it is of essence that such operations are both user friendly and idiot-proof. The Basic INPUT has several drawbacks and is not suitable for serious software. Many programmers use either GET or INPUT using a logical file opened to the screen.

It becomes particularly irritating if you want to limit the characters to be accepted. For example, what if you want to prompt for a response using only Y or N? One way is the routine:

```
10 GET I$: IF I$< >"Y" OR
I$ < >"N" THEN 10
20 IF I$="Y" THEN...
```

This is simple enough but if you want to accept a larger group of characters, the routine becomes messy.

The use of a user defined input routine appeared to be the answer. Such a routine should have the following features:

1) The routine should provide a flashing prompt, easily placed at a specified screen position.
2) A list of acceptable characters should be easily set up.
3) The routine should image the input to screen to allow the user to see what has been input. The ability to delete incorrect characters should be available.
4) The input should be easily limited to a specified length. The input should ignore the screen contents. These will allow the use of formatted displays.
5) The input should be returned in a specific string variable.
6) The routine should ignore a null input.

Such a routine is given in Listing 2. This routine provides all of the features described (the DEL key is used to correct inputs).

This routine has a rather peculiar syntax:

```
SYS 12*4096,B$,A$,X,Y,IL
```

where:

B$: string to hold input
A$: string specifying acceptable

characters
X: X coordinate of input prompt
Y: Y coordinate of input prompt
IL: length of input

Listing 3

```
100 A$="ABCDEFGHIJKLMNOP
QRSTUVWXYZ "
110 A$=A$+"0123456789+-*?!/$%"
130 IL=10:B$="":FORI=1TOIL:B$=
B$+CHR$(32):NEXT
140 SYS12*4096,B$,A$,0,10,IL
150 PRINTCHR$(14)B$
160 GETI$:IFI$=""THEN160
```

In Listing 3 lines 100 and 110 set up the list of acceptable characters in A$. The input length is limited to 10 in line 20 (variable IL). B$ is set up with 10 spaces. This string will hold the input and must clearly be long enough to hold the fill input. Line 140 gets the input with a prompt at the start of line IL.

The routine will put the input at the plkace where B$ is defined. If, for example, you replaced line 130 with:

```
130 IL=10:B$=" [5SPC]
```

If, after using the routine, you were to list the program, you would find that line 130 had been altered. The reason is that if a string is defined in a program, then Basic doesn't bother setting up the string elsewhere. Using the form given in Listing 3 forces Basic to set up the variable B$ and therefore prevents corruption of the program.

Listing 4 gives a demonstration of a simple menu requiring a single key input. It should show how easy the routine is to use.

Listing 4

```
100 A$="DEISP"
110 IL=1:B$=CHR$(32)
130 PRINTCHR$(147)CHR$(17)
TAB(16)"MAIN MENU"
140 PRINTCHR$(17)TAB(14)"I. .
INITIALISE"
150 PRINTCHR$(17)TAB(14)"E. .
ENTER RECORD"
160 PRINTCHR$(17)TAB(14)"D. .
DELETE RECORD"
170 PRINTCHR$(17)TAB(14)"S. .
SEARCH"
180 PRINTCHR$(17)TAB(14)"P. .
PRINT REPORT"
190 PRINTCHR$(17)CHR$(17)TAB
(7)"SELECT OPTION BY ENTER-
ING"
200 PRINTTAB(7)"INDICATED
KEY & PRESSING"
210 PRINTTAB(7)"RETURN"
2000 SYS12*4096,B$,A$,14,16,IL
2010 PRINTCHR$(17)TAB(13)
CHR$(18)B$" WAS SELECTED"
```

That's all for this month. I haven't decided what to tackle next time but I'll think of something. Don't forget, let me have your comments (preferrably no abusive) and suggestions via the editor. YC

```
PROGRAM: LISTING 1

84  1 REM ********************
CE  2 REM *     LISTING 1     *
7A  3 REM ********************
A0  10 SA=12*4096
C6  20 SYS SA+21,53248: REM UPPER
     CASE
51  30 SYS SA+27: REM DEFAULT SCR
    EEN
7A  40 A$="UNIVERSAL MENU ROUTINE
    ":SYS SA+39,A$,1,7,0,0:SYSSA+
    48
1F  50 MW=14:MH=6:XL=4:YL=5:XR=(X
    L-1)+MW:YR=YL+(MH-3):C1=2:C2=
    10
DA  60 ME$="[CA,S*12,CS]"
9B  70 ME$=ME$+"[S-]  OPTION 1  [
    S-2]  OPTION 2  [S-2]  OPTION
     3  [S-2,SPC4]EXIT[SPC4,S-]
0C  80 ME$=ME$+"[CZ,S*12,CX]"
FF  100 REM************************
    ************
BC  110 REM ENTER WITH ME$=MENU S
    TRING
A1  120 REM MW=MENU WIDTH
71  130 REM MH=TOTAL MENU HEIGHT
31  140 REM XL=X COORDINATE TOL L
    EFT CORNER
E5  150 REM YL=Y COORDINATE TOL L
    EFT CORNER+1
A7  160 REM C1,C2= MENU COLOURS
FD  170 REM EXIT WITH TASK=OPTION
     SELECTED
3D  180 REM LP=0 IF MENU ITEM, LP
    =1 IF LAST PAGE
71  190 REM************************
    ************
7B  200 GOSUB60000
0C  210 IF LP=1 THEN30.
43  220 IF TASK<>4 THEN 200
8E  230 PRINTCHR$(147):SYSSA+60:S
    YSSA+9:END
FF  60000 SYS SA+54,ME$,YL-1,XL,M
    W,0,0,C1,C2: RF=0:LP=0:FL=0
BC  60010 SYS SA+48
87  60020 SYS SA+57,1,11:POKE868,
    15
FD  60030 ROW=869: COL=870: SYS S
    A+15,C1,C2
13  60040 IF PEEK(868)=0 AND ((RF
    >0) OR (FL>0))THEN 60170
D7  60050 XC=PEEK(COL): YC=PEEK(R
    OW)
DB  60060 IF (XC<XL) OR (XC>XR) O
    R (YC<YL) OR (YC>YR) THEN 601
    10
AB  60070 IF RF=YC THEN 60040
FD  60080 IF RF<>0 THEN SYS SA+42
    ,XL,RF,MW,1,2
9B  60090 RF=YC: SYS SA+42,XL,RF,
    MW,1,2
F5  60100 GOTO 60040
40  60110 IF (XC>36) AND (YC>=0)
    AND (YC<2) THEN 60150
62  60120 IF FL=1 THEN FL=0: SYS
    SA+15,11,15: SYS SA+42,37,0,2
    ,2,2: SYS SA+15,C1,C2
4C  60130 IF RF=0  THEN 60040
3A  60140 SYS SA+42,XL,RF,MW,1,2:
    RF=0:GOTO60040
3C  60150 IF FL=0 THEN FL=1: SYS
    SA+15,11,15: SYS SA+42,37,0,2
    ,2,2: SYS SA+15,C1,C2
1C  60160 GOTO60040
73  60170 IF FL=1 THEN FL=0: GOTO
    60190
49  60180 TASK=RF-YL+1:RETURN
F0  60190 LP=1:RETURN
```

```
PROGRAM: LISTING 2

C3  2000 FORL=0TO19:CX=0:FORD=0TO
    15:READA:CX=CX+A:POKE49152+L*
    16+D,A:NEXTD
B2  2010 READA:IFA<>CXTHENPRINT"E
    RROR IN LINE";2040+(L*10):STO
    P
0F  2020 NEXTL:END
76  2040 DATA160,100,169,32,153,6
    2,3,136,208,250,32,169,192,16
    5,34,133,1998
E8  2050 DATA170,165,35,133,171,3
    2,169,192,32,182,192,32,191,1
    92,165,20,2073
9F  2060 DATA141,231,3,32,191,192
    ,165,20,141,230,3,32,191,192,
    165,20,1949
B4  2070 DATA141,228,3,32,201,192
    ,160,0,140,229,3,32,228,255,2
    08,12,2054
C3  2080 DATA172,229,3,32,8,193,3
    2,8,193,76,59,192,201,13,240,
    68,1719
FB  2090 DATA201,20,208,19,172,22
    9,3,192,0,240,224,136,206,229
    ,3,169,2250
B1  2100 DATA32,145,253,76,59,192
    ,172,229,3,204,228,3,240,205,
    160,0,2201
AB  2110 DATA209,251,240,9,200,20
    4,232,3,208,246,76,59,192,172
    ,229,3,2533
53  2120 DATA153,62,3,32,40,193,1
    45,253,204,228,3,240,174,200,
    238,229,2397
BC  2130 DATA3,76,59,192,172,229,
    3,240,162,160,0,185,62,3,145,
    170,1861
54  2140 DATA204,229,3,240,3,200,
    208,243,96,32,253,174,32,158,
    173,32,2280
1C  2150 DATA165,182,141,232,3,96
    ,165,34,133,251,165,35,133,25
    2,96,32,2116
CB  2160 DATA253,174,32,138,173,3
    2,247,183,96,169,4,133,254,16
    9,0,133,2190
A3  2170 DATA253,172,230,3,192,0,
    240,16,24,165,253,105,40,133,
    253,165,2244
56  2180 DATA254,105,0,133,254,13
    6,208,240,24,165,253,109,231,
    3,133,253,2501
D0  2190 DATA165,254,105,0,133,25
    4,96,140,132,3,160,100,162,10
    0,202,208,2214
59  2200 DATA253,136,208,248,172,
    132,3,96,172,229,3,177,253,14
    1,61,3,2287
7E  2210 DATA44,61,3,16,9,177,253
    ,41,127,145,253,76,36,193,177
    ,253,1864
8D  2220 DATA9,128,145,253,32,247
    ,192,96,201,64,176,1,96,201,1
    27,176,2144
5F  2230 DATA4,56,233,64,96,56,23
    3,128,96,255,64,255,64,255,64
    ,191,2114
```

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

PROGRAM: SYNTAX CHECKER

```
5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10   :LN=70   :SA=49152
20 FOR L=0 TO BL:CX=0:FOR D=0 TO
 15
30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
40 CX=CX+A:POKE SA+L*16+D,A:NEXT
 D
50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
60 NEXT L:SYS 49152:NEW
70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing! YC

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & f1 key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

Software for sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out.

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Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how lo ng you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, Times House, 179 The Marlowes, Hemel Hempstead, Herts. HP1 1BB.
TEL: (0442) 48435

please contact this address for prices and availability.

The Disk

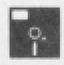
Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format you will also find a couple of symbols after this strap. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

OCTOBER 1986

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Cassettes or disks are available back to March 1986. Please ring the Editorial office (01-437-0626) for details of these.

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CP/M: The Third Facet of the 128

The C128 has three modes – 64, 128 and the much neglected CP/M. In this article we bring you a pocket guide to CP/M and shed light on its uses.

By Mycroftt Appleby

The Commodore 128 comes with CP/M+ as the operating system for the built in Z80 second processor. However, the documentation is sparse and confusing, and information on the supplied utility software is rare. Read on and, you may hear something to your advantage.

CP/M started life as a monitor for the newly introduced Intel 8080 processor evaluation kit and was written by one of its employees. CP/M in those days (c1973) stood for Control Program/Monitor. This monitor handled things like the paper tape reader and writer, punched cards, and a line printer, as well as the teletype console to which it was attached.

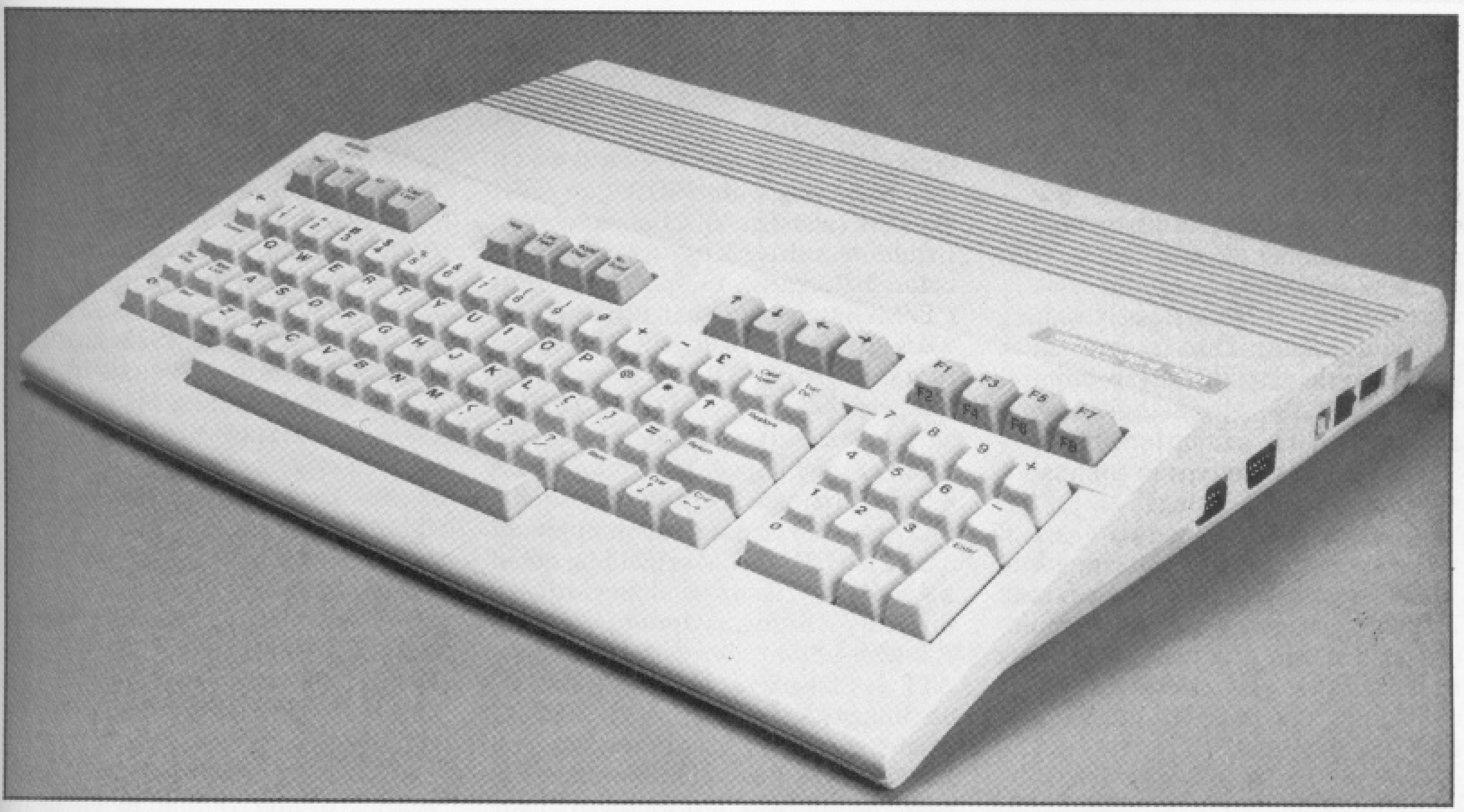
After a short while, Shugart came on the scene. Shugart had just developed the mini disk drive by shrinking the normal eight inch IBM drives down to a handier five inch size. The problem was that they had no real software to make them work. So Shugart asked the chap who wrote CP/M if he could do something with them and make the whole system work together. This was duly done, and the early CP/M had taken shape.

Intel however, didn't want to market this program, so the chap left Intel, worked all the bugs in the program out, set up his own company, and CP/M 1.4 was launched on an unsuspecting public.

The company started out life called Intergalactic Digital Research, but a bank manager probably talked them into droppng the 'Intergalactic'! CP/M was further refined into CP/M 2.2 and the 'standard' CP/M system was defined as a Z80 processor, 64K of memory, between one and eight disk drives, and an 80 × 25 screen. As long as your system had these minimums, software would run. This held immense attractiveness for software houses as instead of writing dozens of different versions of a program for all the different machines, they could just write a CP/M program and put a little program on the same disk that would ask the user to describe what was different about the CP/M system from everybody elses, and you're away.

At about this time CP/M was deemed to mean 'Control Program/ Microcomputers', as it was though that reminding people that this program was just an easy way to hook up paper tube punchers to 8080 development systems (a development system looks like a circuit board, with a calculator display and a small he keypad – that' it!) would just confu them – they were probably righ though when you know that, explains a lot of things!

In around 1980 memory w getting a bit cheaper and all sorts bodges were being used to get mo memory into CP/M systems than t 64K allowed for (64K in 1973 w uncomprehendingly huge). So D (Digitial Research) wrote CP/M 3.0 CP/M+ to cater for it. Up until no CP/M contained a number of com ponents. A boot-ROM that loade CP/M off disk and into memory. BIOS or Basic Input/Output System to handle the paper tape/keyboard printer etc. a BDOS to handle t disks, and the CCP – or Conso Command Processor, which actual does all the donkey work. All the together take up about 12K – though can vary depending on the machin Take out the screen and a small ar for variables and the TPA or Transie Program Area (the place in memo that the programs actually get loade into) starts to shrink. So even with 40K TPA, running a business progra may only give you 10K to play aroun with – not a lot at all.



What CP/M+ does is to allow the Z80 to have 128K in a banked system. This puts the screen, BIOS, BDOS, CCP, and RSXs (more of these later) out of the way, and leaves TPA of around 60K. This still may not sound a lot, but applications programs can also use the banked memory – so you may still have around 59K to play around with for data, – a much better state of affairs. DR also took the opportunity to 'clean up' some of the dodgier bad points of CP/M 2.2 and make it work a lot more user – friendly. CP/M+ also uses RSXs more efficiently by storing them out of the way when the main program is working, what's an RSX? It's a Resident System Extension. This will expand the capabilities of CP/M in some way. It is mainly used for the GSX system which is a logical, machine independent way of handling graphics.

DR also launched a number of new products at this time – CP/Net for networks, MP/M – for multi user applications, and Personal CP/M – for smaller machines without disk drives. However, their drive for world dominance in the business operating system market was killed stone dead in a couple of months by the emergence of the IBM PC and it's operating system called MS-DOS – written by DR's arch rivals Microsoft (who started in a very similar way to DR, except that they were dalled The Kentucky Fried Software Company, and began by writing a program called Basic – but that's another story!). MS-DOS was written from scratch as a 'real' operating system, and not as a hex monitor, and it showed. It was friendly, fast, (relatively) bug-free, and could access 640K of memory. Business men flocked to it in droves. DR eventually recovered with a program called GEM (Graphics Environment Manager), but that's also another story!

The C128 and CP/M

Most people know that a C128 has two processors a Z80 and an 8502. Both can have access to the 128K of main memory, and both can have access to the 16K of video memory (yes, that's right – your C128 is actually a C144, but that would probably only confuse people). What most people don't realise is that the Z80 is the main processor and has priority, and that the 8502 is actually the second processor! When you turn on a C128 (with a disk drive attached) the disk whirrs. This is the CP/M boot ROM trying to load CP/M off disk. If it doesn't manage it, it gives up and grudgingly lets the 8502 have its evil way.

Remembering what I said about the minimum system configuration for CP/M I will assume that you are using a C128 with at least one disk drive, and the 80 column screen facility. You can use the 40 column screen, but this is a window on a logical 80 column screen – much better to use the real thing – also as the 80 column screen has its own 16K memory, you don't loose the odd couple of K here and there.

So pop in your system disk (that with CP/M on it) grind your C128 screaming and kicking into life and hey presto! Nothing particularly exciting happens at all! In fact all you get is a version number, a copyright message, a TPA size, and the letter 'A' followed by a little prompt '>'. Fantastic! Stupendous! Incredible! What happens next? Who cares?

But What does it do?

When you see the prompt, it is telling you three things. Firstly, that the drive you are using is drive A. That you are logged on as user zero, and that the CCP is waiting for input from you. What do these terms mean? Well, CP/M drives are designated by letters from A to P, and you have a drive that all disk operations happen to unless you specify a different one. This is called the default drive. In CP/M the default drive always starts off as 'A'. In the CP/M disk system on the C128 the attached disk drive is always 'A', but it also has a 'RAM Disk' assigned to 'E', this is an area of memory that behaves just like a disk drive, This is to help you with disk copying etc. More about this later.

The user number is a way of keeping 16 different directories on the disk at once. Perhaps you will have WP files on one, Basic programs on another, and a database on another one. These are called User numbers and can be from zero to 15. Like the default drive, CP/M has a default User number. This starts off as zero. If the user number is changed to get at another directory, you will still be able to get at User zero, this works like a global directory that can be accessed by all the others.

If you change the default drive then the display may look like this 'B>' – indicating drive B, and if you change the User number it could look like this '4C>' – indicating User four.

Now the CP/M system is waiting for your input. This is very much similar to the Basic 'Ready' prompt. It means that the current operation is finished and it is waiting for a new one. From here you can type in commands to make CP/M do things.

In CP/M there are two types of command – resident and transient. Resident commands are the ones built into the system. Transient commands are loaded off disk before they are executed. It is these transient commands that take up most of the CP/M system disk.

So, What Happens Next?

The resident commands are fairly simple and are detailed as follows. You can change the default drive by typing in the new letter followed by a colon. So to change to drive 'C' you would type in 'C:'. User numbers can be changed by typing in 'USER n', where 'n' is the new number. DIR displays a directory of disk contents, sorted into alphabetical order, following it with a drive letter and a colon will directory that drive. No letter and the default drive gets it. REN will rename a file. ERA will erase a named file. TYPE will display a named text file on the screen. And DIRSYS will display the system files in a similar manner to DIR. System files are files that are usually loaded in when CP/M is booted and do not normally appear in the directory. This command forces them to be displayed.

These commands also have transient versions. These are extended versions of the commands, whilst due to memory space the built in commands perform only the basest function. Remember that these commands must be present on a disk in the drive for them to function.

DIR, DIRSYS commands can now have a filespec after them using the CP/M wild card system. This wild card system is identical to the Commodore one. In that a '?' stands for any letter, and a '*' stands for anything else in the filename – but remember the file extension that must be specified in all CP/M operations (similar to the PRG, SEQ, USR labels on Commodore drives). So typing in 'DIR FRED*.*' will list all files beginning with 'FRED', or 'DIR *.COM' will list all command files. Including a drive letter followed by a colon before the filespec will direct CP/Ms interest to that drive. Hence 'DIR B:*.BAK' will list all backup files on drive B. Yu can use multiple filespecs.

You may also include an options list after the filespec. The options list is a list of commands enclosed in square brackets and separated by commas. These tell CP/M that something out of the ordinary is to be done with the directory listing. Options are as follows:

ATT – Displays user defined file attributes (don't worry about this – it's of absolutely no use what so ever.)
DATE – Displays the date and time that the file was last changed. Date stamping must have been initialised previously though.
DIR – Only displays files that have the 'DIR' attribute.
DISK=ALL,DRIVE=ALL – (either will do) Displays fallen on all available drives.
DRIVE=(A,B,C) – Displays directory from specified drives only.
DRIVE=A – Only from drive specified.
EXCLUDE – Displays all files except the files specified.
FF – Sends a form feed before listing out the directory. Only really used for printers.
FULL– Displays masses of status information about the file as it is displayed – how long in Kilobytes, how many 128 byte records it takes up, the password protection mode, and the date/time stamps.
LENGTH=x, – Outputs 'x' blank lines before printing the directory, mainly used for printers again.
MESSAGE, – Give out status information as CP/M searches various drives etc. Gives yu something to watch whilst it's all happening.
NOPAGE, – Overides the CP/M+ paging system.
NOSORT, – Displays files in the order that they are found rather that alphabetically sorting them.
RO, – Displays only files that have the read only attribute set.
RW – Displays only files with the read/write attribute set.
SIZE – Shows the length in K of the files.
SYS – Displays only system files.
USER=ALL,USER=n,USER=(0,1,2) – Similar functions to 'DRIVE' except refer to the 16 user numbers.

Device indirection is a very clev piece of software. Say you wanted th RS232 interface to be your printer ou put rather than the normal printe What you can then do is to set th printer output to the RS232 interface simple. But, how do you do it?

As well as all these logical device CP/M also has physical devices. The are:

CRT: – Screen.
CRT2: – Keyboard.
LPT: – Printer.
IOS: – RS232.
NULL: – Nothing (used for turni something off).

To alter the direction something you simply assign it, to tal our example earlier: 'DEVIC LST:=IOS:'. This will set up th default printer output to go to th RS232.

Almost any device can be assigne to any other device with a few excep tions that are handled by the transie commands GET and PUT. So yo could quite easily attach a terminal the computer, type in 'DEVIC CON:5IOS:'. And the computer suddenly being operated by remo control. 'DEVICE CON:=CRT' w change it back to normal.

You can also change options on th devices with this command. Changir the screen has been discussed earlie But as far as the RS232 interface concerned DEVICE AUXIN:[XO 600] will set the RS232 interface inp to the xon protocol and 600 bau Various baud rates are accepted an XON/NOXON controls the han shaking. These options can included in the same statement as th assignment, and multiple assignmen are also allowed. So 'DEVIC LST:=IOS:[NOXON,19200],CON:= CRT' is acceptable.

FORMAT – Is the transient comman to format a CP/M disk prior to us Type in 'FORMAT' and then follo instructions.
INITDIR – This command r organizes the disk directory slightly t allow date/time stamping. This is that whenever a file is written to, th time and date when this happens recorded – but remember to set th date using the DATE command or th system will use the datr when CP/M was written!
SAVE – Will save a program memory to disk – not for the unwar
SET – This is a very powerful co

mand that lets you set a number of attributes for a file or group of files. The SET command basically works in three ways. The first is just setting the attributes as mentioned before. 'SET *.BAK[RO,SYS]' will change all backup files to read only and system files. This can be used with any of the RO,RW,SYS,DIR attributes.

You may have noticed the word 'attributes' appearing above. This refers to certain characteristics that can be set in a file. RO and RW set the file to read only or read/write depending, and will prevent the modification of a file. SYS will turn a file into a system file, and DIR enables directory listing. These attributes will be discussed later in the 'SET' command which is the command used to change these.

The transient versions of ERA, TYPE, and REN are not nearly as complex as DIR. They merely allow the use of filespace rather than discre name. So 'ERA B:*.BAK' will erase all backup files on drive B.

USER has not transient equivalent.

Now What?

Now the fun starts. On your system disk you will find a good few program names. Most of them are transient commands, but a lot of them are better considered as discrete programs.

First let us consider the 'quicky' commands. These are accessed in the same way as the resident commands, by just typing them in. The only difference is a slight delay before they take effect due to their being loaded off disk.

DATE – Sets or displays the date and time, used for date stamping of CP/M+ files when enabled (see INITDIR). To display the date use 'DATE', or to have a continuous display of date and time use 'DATE CONTINUOUS' or 'DATE C', to set the date use 'DATE SET'.

DUMP – Displays a hex dump of a named file.

GET – Gets console input from a disk file rather than from the keyboard. Rather like the BBC micro's 'EXEC' command.

PUT – Writes everything that would have gone to the screen into a disk file instead. Rather like 'SPOOL' on a BBC micro.

DEVICE – This command allows you to set or change physical and logical devices around, and set the characteristics for those devices. Device names are three letters long with a trailing colon. They may also have the suffix 'IN' or 'OUT' to change only that characteristic.

CON: (CONIN:, CONOUT:) – is the console.

DEVICE CON:[COLUMNS=40, LINES=14[– will set the size of the screen.

DEVICE CON:[PAGE] – will display the current size.

AUX: (AUXIN:,AUXOUT:) – is the auxilliary in/out usually attached to the RS232 interface.

LIST: – is the printer output name. It has no options.

The second function changes the drive attribute and name. The drive attribute is either RW or RO, in normal operation it is RW 'SET A:[RO]' will stop you writing to that drive. In addition each disk can have a name conforming to the same rules as CP/M file names (i.e. eight letters a dot and three letters). 'SET A:[NAME= GAMES.001]' will label the disk with that name.

The last function is used with the passwords system that CP/M+ uses. Firstly you can assign a password to the entire disk. This will prevent anyone using the SET command on that disk at all. It takes the form 'SET [PASSWORD=melon]' where 'melon' is the password. To remove the password 'SET [PASSWORD=' is needed. Note that you need the password to get that far, and that you don't need the trailing bracket – Return will do.

To enable password protection on the files on a disk, the password system must first be initialised. 'SET [PROTECT=ON]' will alter this.

To change or set the passwords the command takes on the syntax 'SET FRED*.* [PASSWORD=mike]' where mike is the password and FRED*.* refers to any normal filespec.

Passwords can also be selectively used on certain functions, these are READ, WRITE, DELETE, NONE. One of these functions can be selected, READ affects everything so that yu need a password for almost every access of the file.

WRITE needs a password for writing, renaming, or deleting. This allows the file to be read but not tampered with.

DELETE allows you to do anything to the file except delete it or rename it. NONE turns off the password protection. The syntax is 'SET WP.COM [PROTECT=READ]'.

Default passwords can also be selected. Say all the files on the disk had the password 'fred'. 'SET [DEFAULT=fred]' would remove the need to type in the password every time a file was accessed. Normally the password has to be included in the filespec after a trailing semi-colon. Say a file called 'private,doc' with a password of 'mike' was to be accessed, then the filespec would be 'private,doc;mike'.

The final function of the SET command is to alter the way that date stamping is used (assuming that date stamping has be initialised). The three options ACCESS, UPDATE, and CREATE are used. Access will stamp the file every time that you do anything with it, create only stamps it the first time you write it to disk, and update everytime that you alter the file. Create and Access are mutually exclusive and turning one on will turn the other one off. Syntax is 'SET [UPDATE=ON]'.

SHOW will display certain information about the disk depending on the option list given. SHOW on its own or with a drive name will give you the read/write space remaining. SHOW with an option after it will perform one of the following functions:

LABEL – Will show the disk name, whether the disk is passord protected, the stamp create/update status, and the date that the disk name was created or updated.

USERS – Will list the active user numbers and their respective number of active files and free directory entries.

DIR – Displays the number of free directory entries.

DRIVE – Will output a comprehensive list of the characteristics of that drive.

So typing in 'SHOW A:[DIR]' will give you the number of free directory entries on drive A.

I think that wraps it up for this month. Next month I will be telling you about onoe or two special modifications made to the C128 version of CP/M like the virtual drive and the user defined keyboard. Also I will be detailing some of the really complicated commands, as well as explaining some of the more obscure concpets that CP/M uses. So if you are confused (I know I am!) all will be revealed next month. YC

Evesham Micros

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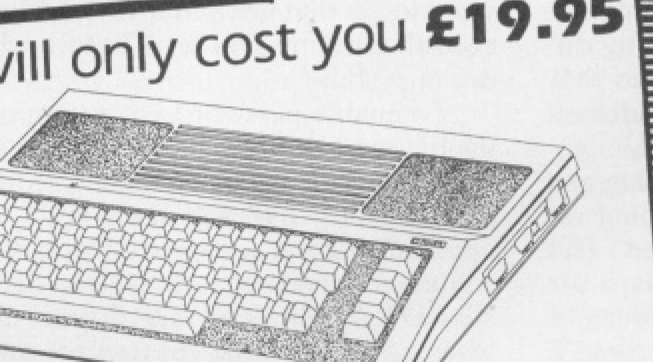
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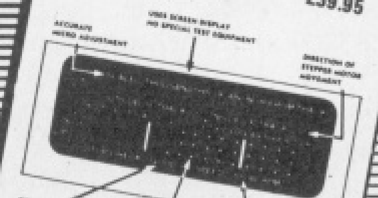
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Here we start a series of very handy utilities written specially for disk users.

By Les Allan

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Memory Saver is a useful routine aimed at saving all your machine's memory from $0801 to $FFFF. It is not intended to promote piracy, which may be the immediate conclusion which you leap to, because unlike commercial *Freeze Frames*, to name but one, the user can only work with material which is under his control. Without the knowledge of a start address it is of no use to you whatsoever.

The Facts

Two machine code routines are located at $0247 and $033C which provide the means to save memory between $0801 and $FFFF. The program saves three files as follows:

1. Main part – from $0801 to $CFFF
2. Kernal – from $D000 - $CFFF

In order to make use of the kernal routines for saving etc. this part is relocated to $1000 and then saved between $1000 - $3FFF.

3. Boot part – from $0801 - $3FFF

This part contains the character and kernal RAM which is saved between $1000 - $3FFF. Two m/c routines are included to perform the following:

(i) relocates the character/kernal ram to $D00 - $FFFF
(ii) loads in the MAIN file and then runs it.

OK, so how do you go about using it!

Point number one is that you must know the start address of the program or you're lost before you start.

Instructions

1. Load in the program to convert into two parts
2. Press re-set switch if required (Quickdisk preferred).
3. Load "MEM1",8,1.
4. Load "MEM2",8,1.
5. Type in Basic SYS call i.e. 10 SYS2061 (if that's the start address, of course). A JMP$... command can be used to replace the RUN command in the BOOT file but you will need to use a m/c monitor or disk monitor to do this.
6. SYS 828 to save memory.
7. The two files BOOT and MAIN are now a complete working copy which can be individually crunched to save working space.
8. If, when the MAIN part is crunched, it crunches to less than 154 blocks then the KERN part $1000 can be appended to this.

Remember that it is illegal to pirate software so this routine is for use with your own software!

The program as listed must be typed in exactly as written and saved prior to running. Error trap routines are included to ensure that the data as read is correct. The program when run stores the relevant code at a temporary address of $8000 and when prompted relocates the working programs to Basic, warm start area and the cassette buffer and saves the programs to disk.

DISKIT 2

When programs are saved to disk very often there is a considerable duplication of adjacent data in memory which can be compressed by the use of a code compressor.

This Turbo Cruncher will work with either Basic or machine code programs providing that the program resides in memory from between $0801 and $D000.

The utility provides the user with the facility to view the directory with the F1 key or go straight to the cruncher with the F7 key. The program is then read in at turbo rate, common code compressed and re-saved back to disk at turbo rate prefixed with a '+'.

The skill of the user will determine the results that are available but it is possible to fill memory with common code, $EA for example, load in the machine code to memory and finally add a Basic boot to provide a single file that may exist between $0801 and $D000. The finished file can then be Turbo Crunched to produce a smaller working version which could be as small as 17 blocks which, considering the saved file was 202 blocks, represents a considerable saving on disk space.

Remember that it is illegal to pirate software so make sure that you only do this to your own programs!

The program must be typed in exactly as written and saved prior to running. Error trap routines are included to ensure that the data as read is correct. The program when run stores the relevant code at a temporary address of $8000 and when prompted relocates the working program to Basic ($0801) and saves the program to disk.

DISKIT 3

This machine code program resides in the cassette buffer at $033C and enables a program to be made into one part from the files called '+MAIN' and 'KERN'.

The program works by taking the results from the MEMORY SAVER routine which creates three files 'MAIN' 'KERN' and 'BOOT'. If, when the MAIN file is Turbo Crunched the total length of the file is

less than 154 blocks (i.e. 153 blocks max) then sufficient room exists from $A000 — $D000 in which to fit the 'KERN' part of the program.

It is most important, because of the way in which this routine is written, to use the Turbo Cruncher cruncher that is characterised by a two tone grey flashing border and a sys call of 0 SYS 2061.

Instructions

1. Convert program into three parts 'MAIN' 'KERN' and 'BOOT' using MEMORY SAVER.
2. Turbo Crunch the file 'MAIN' and IF the resulting file '+MAIN' is less than 154 blocks THEN this routine can be continued ELSE crunch the 'BOOT' file to provide a low memory useage of the program, one part maker can not be used with this program.
3. The files to be used must be resident on disk with at least 202 blocks free and called '+MAIN' and 'KERN'.
4. Load 'MEM3',8,1 to load m/c routine.
5. SYS 828 to start transfer process which loads '+MAIN', relocates the 'KERN' to $A000, transfer kernal relocation program to $9FDO and saves the final 'ONE PART' file.
6. Turbo Cruncher the 'ONE PART' file to further reduce disk space.

Remember that it is illegal to pirate software so make sure that you only do this to your own programs!

The program as listed must be typed in exactly as written and saved prior to running. Error trap routines are included to ensure that the data as read is correct. The program when run stores the relevant code at a temporary address of $800 and when prompted relocates the working program to Basic ($0801) and saves the program to disk. YC

PROGRAM: MEMORY SAVE CREATOR

```
3E  10 M1=32768:M2=36095:CH=0
97  11 PRINTCHR$(144)CHR$(147)
C8  12 POKE52,120:POKE56,120:POKE
    53280,15:POKE53281,12
94  13 PRINT
8F  14 PRINTSPC(8)CHR$(18)"[SU,S*
    22,SI]
2E  15 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
84  16 PRINTSPC(8)CHR$(18)"[S-,SP
    C4]DATA  STATEMENT[SPC3,S-]
3C  17 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
E5  18 PRINTSPC(8)CHR$(18)"[S-]
    TO MEMORY  ROUTINE  [S-]
4A  19 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
22  20 PRINTSPC(8)CHR$(18)"[S-,SP
    C5]BY LES ALLAN[SPC5,S-]
50  21 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
6C  22 PRINTSPC(8)CHR$(18)"[SJ,S*
    22,SK]
A0  23 PRINT:PRINTCHR$(155)
42  24 PRINT" THIS ROUTINE READS
    THE DATA STATEMENT,"
80  25 PRINT
17  26 PRINT" CONVERTS FROM  HEX
    TO BINARY AND POKES"
82  27 PRINT
C4  28 PRINT" CODE BACK  TO THE
    AREA OF MEMORY FROM"
94  29 PRINT
19  30 PRINT" WHICH  IT  WAS  PRE
    VIOUSLY  GENERATED."
59  31 PRINT:PRINT
D0  32 READCODE$
58  33 LB=ASC(RIGHT$(CODE$,1))-48
    :IFLB>9THENLB=LB-7
CF  34 HB=ASC(LEFT$(CODE$,1))-48:
    IFHB>9THENHB=HB-7
32  35 PRINTSPC(5)CHR$(5)"READING
     MEMORY BLOCK ...";M1:PRINTCH
    R$(145);
28  36 POKEM1,HB*16+LB:M1=M1+1:CH
    =CH+HB+LB:IFM1<M2THEN32
DA  37 IFCH=43423THEN39
13  38 PRINT"CHECK SUM ERROR - CH
    ECK DATA STATEMENTS!":PRINTCH
    R$(19):END
EC  39 PRINT"  HIT RETURN TO SAVE
     COMPLETED PROGRAM"
D1  40 GETKEY$:IFKEY$<>CHR$(13)TH
    EN40
67  41 SYS35888
10  42 :
CE  43 :::::::::::::::::::: DATUM S
    TATEMENTS ::::::::::::::::::
16  44 :
18  45 DATA 00,10,08,00,00,98,41,
    B2,30,A7,9E,34,37,36,38,00
61  46 DATA 00,00,56,57,DC,16,E4,
    E6,67,F0,64,63,57,68,5F,55
80  47 DATA 57,C0,62,54,65,6F,57,
    78,66,62,6D,C0,62,64,65,6F
D2  48 DATA 66,78,66,65,6D,CE,90,
    7F,66,63,60,7E,6D,CE,57,3E
36  49 DATA 5F,54,57,CE,F1,62,7E,
    75,45,C7,82,97,97,97,97,97
A5  50 DATA 97,97,97,97,97,97,97,
    97,97,97,97,97,97,97,97,97
E0  51 DATA 97,97,97,97,97,97,97,
    9E,57,C5,5F,53,57,CE,F1,62
BB  52 DATA 7E,75,45,8A,77,77,77,
    77,77,77,77,77,77,77,77,77
9A  53 DATA 77,77,77,77,77,77,77,
    77,77,77,77,77,77,77,77,77
74  54 DATA 8A,57,EC,5F,52,57,CE,
    F1,62,7E,75,45,8A,77,1A,12
85  55 DATA 1A,18,05,0E,77,04,16,
    01,12,05,77,71,77,16,02,03
70  56 DATA 18,77,15,18,18,03,12,
    05,77,8A,57,E3,5F,51,57,CE
0F  57 DATA F1,62,7E,75,45,8A,77,
    77,77,77,77,77,77,77,77,77
9D  58 DATA 77,77,77,77,77,77,77,
    77,77,77,77,77,77,77,77,77
61  59 DATA 77,77,8A,57,5A,5E,50,
    57,CE,F1,62,7E,75,45,8A,77
E4  60 DATA 77,77,77,77,04,16,01,
    12,04,77,1A,12,1A,18,05,0E
83  61 DATA 77,11,05,18,1A,77,77,
    77,77,77,77,8A,57,61,5E,5F
90  62 DATA 57,CE,F1,62,7E,75,45,
    8A,77,77,77,77,77,77,77,77
E0  63 DATA 77,77,77,77,77,77,77,
    77,77,77,77,77,77,77,77,77
A2  64 DATA 77,77,77,77,8A,57,08,
    5E,5E,57,CE,F1,62,7E,75,45
20  65 DATA 8A,77,73,67,6F,67,66,
    7A,73,14,11,11,11,77,77,77
58  66 DATA 77,73,13,67,67,67,7A,
    73,11,11,11,11,77,8A,57,DF
98  67 DATA 5E,5D,57,CE,F1,62,7E,
    75,45,8A,77,77,77,77,77,77
E6  68 DATA 77,77,77,77,77,77,77,
    77,77,77,77,77,77,77,77,77
B7  69 DATA 77,77,77,77,77,77,8A,
    57,E6,5E,5C,57,CE,F1,62,7E
EF  70 DATA 75,45,8A,77,77,77,77,
    00,05,1E,03,03,12,19,77,15
E0  71 DATA 0E,77,18,12,04,77,16,
    1E,18,16,19,77,77,77,77,8A
25  72 DATA 57,8D,5E,5B,57,CE,F1,
    62,7E,75,45,8A,77,77,77,77
6E  73 DATA 77,77,77,77,77,77,77,
    77,77,77,77,77,77,77,77,77
09  74 DATA 77,77,77,77,77,77,77,
    77,8A,57,54,5D,5A,57,CE,F1
8F  75 DATA 62,7E,75,45,9D,94,94,
    94,94,94,94,94,94,94,94,94
93  76 DATA 94,94,94,94,94,94,94,
    94,94,94,94,94,94,94,94,94
A0  77 DATA 94,9C,57,5C,5D,59,57,
    CE,6D,CE,57,6D,5D,58,57,CE
63  78 DATA 75,CC,77,77,03,1F,1E,
    04,77,05,18,02,03,1E,19,12
5B  79 DATA 77,00,1F,12,19,77,18,
    18,16,13,12,13,77,1E,19,03
49  80 DATA 18,77,1A,12,1A,18,05,
    0E,75,57,3F,5D,47,57,CE,75
84  81 DATA 77,77,04,16,01,12,04,
    77,03,1F,12,77,0C,18,05,1C
7F  82 DATA 1E,19,10,77,07,16,05,
    03,77,18,11,77,77,16,77,07
B4  83 DATA 05,18,10,05,16,1A,75,
    57,C1,5D,46,57,CE,75,77,77
53  84 DATA 1E,19,77,03,00,18,77,
    07,16,05,03,04,79,77,03,1F
7E  85 DATA 12,77,14,1F,16,05,15,
    14,03,12,05,77,04,12,03,77
CC  86 DATA 77,16,19,13,75,57,93,
    5D,45,57,CE,75,77,77,03,1F
55  87 DATA 12,77,77,1C,12,05,19,
    15,1B,77,1E,04,77,77,05,12
B2  88 DATA 1B,18,14,16,03,12,13,
    77,77,03,18,77,77,73,66,67
05  89 DATA 67,67,75,57,9C,5D,44,
    57,CE,6D,57,AE,5D,43,57,CE
8C  90 DATA 75,77,77,16,77,77,15,
    18,18,03,77,05,18,02,03,1E
73  91 DATA 19,12,77,77,1E,04,77,
    16,1B,04,18,77,04,16,01,12
79  92 DATA 13,77,00,1F,1E,14,1F,
    75,57,70,5C,42,57,CE,75,77
1D  93 DATA 77,05,12,15,1B,14,16,
    03,12,04,77,03,1F,12,77,77
EB  94 DATA 14,1F,16,05,16,14,03,
    12,05,77,77,16,19,13,77,1C
5E  95 DATA 12,05,19,16,1B,75,57,
    02,5C,41,57,CE,75,77,77,16
31  96 DATA 19,13,77,03,1F,12,19,
    77,1B,18,16,13,04,77,71,77
46  97 DATA 77,05,02,19,04,77,03,
    1F,12,77,1A,16,1E,19,77,07
14  98 DATA 16,05,03,75,57,30,5C,
    40,57,DC,95,7F,66,6E,60,7E
DE  99 DATA E5,61,63,F0,65,64,57,
    2F,5C,4F,57,CE,75,C6,C6,C6
27  100 DATA C6,C6,C6,C6,C6,C6,75
    ,57,F1,5C,4E,57,CE,75,77,77
57  101 DATA 11,19,16,15,18,00,77
    ,77,03,1F,12,77,77,04,1E,1A
E1  102 DATA 07,16,12,77,1E,19,04
    ,03,05,02,14,03,1E,18,19,04
F7  103 DATA 77,16,19,13,75,57,83
    ,5C,4D,57,CE,75,77,77,1E,03
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FF  104 DATA 77,04,1F,18,02,16,13
    ,77,15,12,77,07,18,04,04,1F
2D  105 DATA 15,1E,12,77,03,18,77
    ,14,16,19,01,12,05,03,77,16
A3  106 DATA 1E,1B,75,57,55,5B,4C
    ,57,CE,75,77,77,03,1F,18,04
F4  107 DATA 12,77,77,1A,02,18,03
    ,1F,7A,07,16,05,03,77,77,07
95  108 DATA 05,19,10,05,16,1A,04
    ,77,1E,19,03,18,77,18,19,12
A0  109 DATA 75,57,67,5B,48,57,CE
    ,75,77,77,18,05,77,16,03,77
99  110 DATA 1A,18,04,03,77,03,00
    ,18,77,07,16,05,03,04,79,1E
6D  111 DATA 03,77,1E,04,77,19,12
    ,14,12,04,04,1E,05,05,75,57
05  112 DATA 09,5B,4A,57,CE,75,77
    ,77,1F,18,00,12,01,12,05,7B
D2  113 DATA 77,77,03,18,77,1C,19
    ,18,00,77,77,03,1F,12,77,04
BF  114 DATA 03,16,05,03,77,16,13
    ,13,05,12,04,04,75,57,DE,5B
F4  115 DATA 49,57,CE,75,77,77,18
    ,11,77,03,1F,12,77,07,05,18
4D  116 DATA 10,05,16,1A,77,00,1F
    ,1E,14,1F,77,14,16,19,77,15
A1  117 DATA 12,77,16,13,13,12,13
    ,77,03,18,75,57,ED,5B,48,57
D2  118 DATA CE,75,77,77,03,1F,12
    ,77,15,18,18,03,77,11,1E,1B
71  119 DATA 12,77,18,05,77,16,04
    ,77,16,77,1B,1E,19,12,77,19
F8  120 DATA 02,1A,15,12,09,77,03
    ,18,75,57,BF,5B,77,57,CE,75
6B  121 DATA 77,77,03,1F,12,77,1A
    ,16,1E,19,77,11,1E,1B,12,77
A1  122 DATA 77,77,77,77,77,77,12
    ,79,10,79,77,66,67,77,04,0E
D2  123 DATA 04,77,65,67,61,66,75
    ,57,AD,5B,76,57,DC,95,7F,66
EE  124 DATA 6E,60,7E,E5,61,63,F0
    ,E4,64,57,44,5A,75,57,DC,16
0D  125 DATA E5,67,F0,16,E5,66,6D
    ,D4,75,1A,12,1A,66,75,76,6F
74  126 DATA 7B,66,57,7D,5A,74,57
    ,DC,16,E5,66,F0,16,E5,65,6D
1E  127 DATA D4,75,1A,12,1A,65,75
    ,76,6F,7B,66,57,69,5A,73,57
CC  128 DATA DC,95,7F,66,6E,60,7E
    ,E5,61,63,F0,64,61,57,1D,5A
F1  129 DATA 72,57,CE,90,7F,66,63
    ,60,7E,57,21,5A,71,57,CE,75
C3  130 DATA 77,77,66,79,77,77,77
    ,1D,18,16,13,77,1E,19,77,07
E1  131 DATA 05,18,10,05,16,1A,77
    ,11,18,05,77,14,18,19,01,12
5E  132 DATA 05,04,1E,18,19,57,F2
    ,5A,70,57,CE,6D,CE,75,77,77
AD  133 DATA 65,79,77,77,77,07,05
    ,12,04,04,77,05,12,7A,04,12
C5  134 DATA 03,77,04,00,1E,03,14
    ,1F,77,1E,11,77,05,12,06,02
CA  135 DATA 1E,05,12,13,57,94,5A
    ,7F,57,CE,6D,CE,75,77,77,64
CA  136 DATA 79,77,77,77,18,18,16
    ,13,70,1A,12,1A,66,70,76,6F
0B  137 DATA 7B,66,57,86,5A,7E,57
    ,CE,6D,CE,75,77,77,63,79,77
14  138 DATA 77,77,1E,18,16,13,70
    ,1A,12,1A,65,7C,7D,6F,7B,66
7E  139 DATA 57,5A,59,7D,57,CE,6D
    ,CE,75,77,77,62,79,77,77,77
A9  140 DATA 04,0E,04,6F,65,6F,77
    ,03,18,77,04,16,01,12,77,07
4A  141 DATA 05,19,10,05,16,1A,77
    ,07,16,05,03,04,57,63,59,7C
EB  142 DATA 57,CE,6D,CE,75,77,77
    ,77,77,77,77,77,1A,16,1E,19
77  143 DATA 77,07,16,05,03,77,73
    ,67,6F,67,66,77,7A,77,73,14
FF  144 DATA 11,11,11,57,0C,59,7B
    ,57,CE,6D,CE,75,77,77,77,77
21  145 DATA 77,77,77,1C,12,05,19
    ,16,1B,77,77,77,77,73,13,67
08  146 DATA 67,67,77,7A,77,73,11
    ,11,11,11,57,D5,59,7A,57,CE
D1  147 DATA 6D,CE,75,77,77,77,77
    ,77,77,77,15,18,18,03,77,77
71  148 DATA 77,77,77,77,73,67,6F
    ,67,66,77,7A,77,73,64,11,11
1F  149 DATA 11,57,FB,59,79,57,CE
    ,6D,CE,75,77,77,61,79,77,77
2B  150 DATA 77,14,05,02,19,14,1F
    ,77,14,18,13,12,77,03,18,77
67  151 DATA 04,16,01,12,77,1A,12
    ,1A,18,05,0E,57,09,59,78,57
87  152 DATA CE,6D,CE,6D,CE,75,77
    ,1C,12,05,19,16,1B,77,1E,04
6D  153 DATA 77,04,16,01,12,13,77
    ,15,12,03,00,12,12,19,77,77
1C  154 DATA 73,65,67,67,57,77,71
    ,77,73,64,11,11,11,57,58,58
C0  155 DATA 67,57,CE,6D,CE,75,15
    ,18,18,03,77,07,16,05,03,77
4B  156 DATA 05,12,1B,18,14,16,03
    ,12,04,77,1C,12,05,19,16,1D
03  157 DATA 77,16,02,03,18,1A,16
    ,03,1E,14,16,1B,1B,0E,57,76
3D  158 DATA 58,66,57,DC,95,7F,66
    ,6E,60,7E,E5,61,63,F0,63,6E
D8  159 DATA 57,7B,58,65,57,C9,61
    ,62,66,65,61,57,65,58,64,57
D8  160 DATA 6D,57,0C,58,63,57,6D
    ,6D,6D,6D,6D,6D,6D,6D,6D,6D
96  161 DATA 6D,6D,6D,6D,6D,6D,6D
    ,6D,6D,6D,6D,6D,6D,6D,6D,6D
C1  162 DATA 6D,6D,6D,6D,6D,6D,6D
    ,6D,6D,6D,57,D3,58,62,57,6D
D4  163 DATA 6D,6D,6D,6D,6D,6D,6D
    ,6D,6D,6D,6D,6D,6D,6D,6D,6D
1E  164 DATA 6D,6D,6D,6D,6D,6D,6D
    ,6D,6D,6D,6D,6D,6D,6D,6D,6D
FF  165 DATA 6D,6D,6D,57,FA,58,61
    ,57,6D,6D,77,77,77,77,77,77
89  166 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,77,77,77,77
E6  167 DATA 77,77,77,77,77,77,77
    ,77,77,77,6D,6D,57,83,58,60
BC  168 DATA 57,6D,6D,77,77,77,08
    ,12,1A,15,12,05,77,00,1F,12
62  169 DATA 19,77,0E,18,02,77,03
    ,16,1C,12,77,03,1F,12,77,77
BE  170 DATA 77,6D,6D,57,AA,58,6F
    ,57,6D,6D,77,77,77,77,77,77
CC  171 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,77,77,77,77
57  172 DATA 77,77,77,77,77,77,77
    ,77,77,77,6D,6D,57,73,47,6E
F9  173 DATA 57,6D,6D,77,77,77,14
    ,05,12,13,1E,03,77,D6,77,03
79  174 DATA 1F,1E,04,77,77,07,05
    ,18,10,05,16,1A,1A,12,77,77
F5  175 DATA 77,6D,6D,57,1A,47,6D
    ,57,6D,6D,77,77,77,77,77,77
D7  176 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,77,77,77,77
87  177 DATA 77,77,77,77,77,77,77
    ,77,77,77,6D,6D,57,21,47,6C
CF  178 DATA 57,6D,6D,77,77,77,03
    ,1F,16,03,77,1A,16,19,0E,77
95  179 DATA 1F,18,02,05,04,77,00
    ,12,05,12,77,04,07,12,19,03
D1  180 DATA 77,77,77,6D,6D,57,C8
    ,47,6B,57,6D,6D,77,77,77,77
1A  181 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,77,77,77,77
48  182 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,6D,6D,57,94
5D  183 DATA 47,6A,57,6D,6D,77,77
    ,77,15,0E,77,03,1F,12,77,16
56  184 DATA 02,03,1F,E7,77,F3,77
    ,C3,77,77,0E,18,02,77,77,77
80  185 DATA 6D,6D,57,BE,47,69,57
    ,6D,6D,77,77,77,77,77,77,77
1D  186 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,77,77,77,77
FA  187 DATA 77,77,77,77,77,77,77
    ,77,77,6D,6D,57,44,46,6B,57
CB  188 DATA 6D,6D,77,77,77,03,1E
    ,1A,12,77,04,18,77,14,18,1A
64  189 DATA 12,77,C6,77,15,12,77
    ,16,77,04,07,E7,03,77,77,77
33  190 DATA 6D,6D,57,66,46,17,57
    ,6D,6D,77,77,77,77,77,77,77
60  191 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,77,77,77,77
03  192 DATA 77,77,77,77,77,77,77
    ,77,77,6D,6D,57,36,46,16,57
06  193 DATA 6D,6D,77,77,77,F8,77
    ,10,1E,01,12,77,77,03,1F,12
40  194 DATA 77,77,1F,C6,18,02,05
    ,04,77,77,F3,77,77,77,6D,6D
8A  195 DATA 57,DD,46,15,57,6D,6D
    ,77,77,77,77,77,77,77,77,77
6B  196 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,77,77,77,77
69  197 DATA 77,77,77,77,77,77,77
    ,6D,6D,57,E5,46,14,57,6D,6D
21  198 DATA 77,77,77,03,1F,12,77
    ,16,02,03,1F,E7,77,77,77,77
7C  199 DATA 77,77,77,1B,12,04,77
    ,16,1B,1B,16,19,77,77,77,6D
20  200 DATA 6D,57,8C,46,13,57,6D
    ,6D,77,77,77,77,77,77,77,77
EE  201 DATA 77,77,77,77,77,77,77
    ,77,77,77,77,77,77,77,77,77
E9  202 DATA 77,77,77,77,77,77,77
    ,77,6D,6D,57,55,45,12,57,6D
40  203 DATA 6D,77,77,77,65,6F,77
    ,16,03,1C,1E,19,04,C6,77,13
A7  204 DATA 05,1E,01,12,77,77,77
    ,19,70,07,E7,03,77,77,77,6D
A5  205 DATA 3A,00,2B,12,46,00,3A
    ,3A,20,20,20,20,20,20,20,20
41  206 DATA 20,20,20,20,20,20,20
    ,20,20,20,20,20,20,20,20,20
47  207 DATA 20,20,20,20,20,20,20
    ,20,3A,3A,00,54,12,47,00,3A
47  208 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
26  209 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
DD  210 DATA 3A,3A,3A,00,7D,12,48
    ,00,3A,3A,3A,3A,3A,3A,3A,3A
A4  211 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
AB  212 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,00,00,00,00
60  213 DATA 41,00,81,00,00,00,00
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
E9  214 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
85  215 DATA A9,1D,8D,10,08,A9,08
    ,8D,11,08,A9,00,85,FB,A9,08
0F  216 DATA 85,FC,A0,12,B1,FB,49
    ,57,91,FB,C8,D0,F7,E6,FC,A5
3F  217 DATA FC,C9,12,D0,EF,60,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
3D  218 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
7C  219 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
83  220 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
21  221 DATA A2,00,BD,0D,08,9D,A7
    ,02,E8,E0,59,D0,F5,4C,67,02
7F  222 DATA 78,A9,34,85,01,A0,00
    ,84,FB,84,FD,A9,10,85,FC,A9
F6  223 DATA D0,85,FE,B1,FB,91,FD
    ,C8,D0,F9,E6,FC,E6,FE,D0,F3
B2  224 DATA A9,37,85,01,58,A9,08
    ,AA,A8,20,BA,FF,A9,04,A2,FA
43  225 DATA A0,02,20,BD,FF,A9,00
    ,20,D5,FF,20,E0,A6,20,8E,A6
71  226 DATA 4C,AE,A7,4D,41,49,4E
    ,CC,D0,EE,EE,EE,EE,EE,EE,EE
7E  227 DATA A9,36,85,01,A9,01,85
    ,2B,A9,08,85,2C,A9,E9,8D,FE
A5  228 DATA 03,A9,DC,8D,FF,03,20
    ,CE,03,78,A9,34,85,01,A0,00
2F  229 DATA 84,2B,84,FB,84,FD,A9
    ,10,85,2C,85,FC,A9,D0,85,FE
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46  230 DATA 81,FD,91,FE,C8,D0,F9
        ,E6,FC,E6,FE,DC,F3,A9,37,85
7D  231 DATA 01,58,A9,ED,8D,FE,03
        ,A9,40,8D,FF,03,20,CE,03,A9
14  232 DATA 00,A8,84,FB,A2,08,86
        ,FC,91,FE,C8,D0,FB,E6,FC,A6
7E  233 DATA FC,E0,10,D0,F3,A2,00
        ,BD,F5,03,9D,01,08,E8,E0,09
53  234 DATA D0,F5,A2,00,BD,A7,02
        ,9D,0B,08,E8,E0,59,D0,F5,A9
F3  235 DATA 01,85,2B,A9,08,85,2C
        ,A9,F1,8D,FE,03,20,CE,03,4C
72  236 DATA 66,FE,A9,08,AA,A8,20
        ,BA,FF,A9,04,AE,FE,03,AC,03
B3  237 DATA 20,BD,FF,A9,2B,A2,00
        ,AC,FF,03,4C,D8,FF,4D,41,49
24  238 DATA 4E,4B,45,52,4E,42,4F
        ,4F,54,0B,08,0C,00,9E,32,30
59  239 DATA 36,31,00,00,EE,EE,EE
        ,EE,EE,EE,EE,EE,EE,EE,EE,EE
8C  240 DATA A0,00,A8,85,FB,85,FD
        ,A9,80,85,FC,A9,08,85,FE,B1
EF  241 DATA FB,91,FD,C8,D0,F9,E6
        ,FC,E6,FE,A5,FC,C9,AC,D0,EF
DB  242 DATA A2,00,BD,C0,8B,9D,A7
        ,02,E8,E0,59,DC,F5,A2,00,BD
76  243 DATA 60,8B,9D,3C,03,E8,E0
        ,C4,D0,F5,A9,08,AA,A8,20,BA
77  244 DATA FF,A9,0C,A2,D0,A0,8C
        ,20,BD,FF,A9,01,85,2B,A9,C8
CA  245 DATA 85,2C,A9,2B,A2,D0,A0
        ,12,20,D8,FF,A9,04,A2,E0,A0
FA  246 DATA 8C,20,BD,FF,A9,A7,85
        ,2B,A9,02,85,2C,A9,2B,A2,00
1C  247 DATA A0,03,20,D8,FF,A9,04
        ,A2,E8,A0,8C,20,BD,FF,A9,3C
38  248 DATA 85,2B,A9,03,85,2C,A9
        ,2B,A2,00,A0,04,20,D8,FF,4C
1F  249 DATA 66,FE,EE,EE,EE,EE,EE
        ,EE,EE,EE,EE,EE,EE,EE,EE,EE
01  250 DATA 4D,45,4D,4F,52,59,20
        ,53,41,56,45,52,EE,EE,EE,EE
29  251 DATA 4D,45,4D,31,EE,EE,EE
        ,EE,4D,45,4D,32,EE,EE,EE,EE
23  252 DATA EE,EE,EE,EE,EE,EE,EE
        ,EE,EE,EE,EE,EE,EE,EE,EE,EE
C7  253 :
C4  254 :
FF  255 ::::::::::::::::::::::::::
        ::::::::::::
A4  256 :  MEMORY SAVER     BY LE
        S ALLAN    :
0D  257 :  28 ATKINSON DRIVE  NEW
        PORT IW    :
03  258 ::::::::::::::::::::::::::
        ::::::::::::
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PROGRAM: TURDO CRUNCHER CREATOR

```
44  10 M1=32768:M2=38960:CH=0
97  11 PRINTCHR$(144)CHR$(147)
C8  12 POKE52,120:POKE56,120:POKE
    53280,15:POKE53281,12
94  13 PRINT
0F  14 PRINTSPC(8)CHR$(18)"[SU,S*
    22,SI]
25  15 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
B4  16 PRINTSPC(8)CHR$(18)"[S-,SP
    C4]DATA  STATEMENT[SPC3,S-]
3C  17 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
E5  18 PRINTSPC(8)CHR$(18)"[S-]
    TO MEMORY  ROUTINE  [S-]
4A  19 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
22  20 PRINTSPC(8)CHR$(18)"[S-,SP
    C5]BY LES ALLAN[SPC5,S-]
50  21 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
6C  22 PRINTSPC(8)CHR$(18)"[SJ,S*
    22,SK]
A0  23 PRINT:PRINTCHR$(155)
42  24 PRINT" THIS ROUTINE READS
    THE DATA STATEMENT,"
8C  25 PRINT
17  26 PRINT" CONVERTS FROM  HEX
    TO BINARY AND POKES"
82  27 PRINT
C4  28 PRINT" CODE BACK  TO THE
    AREA OF MEMORY FROM"
84  29 PRINT
19  30 PRINT" WHICH  IT  WAS  PRE
    VIOUSLY  GENERATED."
59  31 PRINT:PRINT
DC  32 READCODE$
E8  33 LB=ASC(RIGHT$(CODE$,1))-48
    :IFLB>9THENLB=LB-7
CF  34 HB=ASC(LEFT$(CODE$,1))-48:
    IFHB>9THENHB=HB-7
32  35 PRINTSPC(5)CHR$(5)"READING
     MEMORY BLOCK ...";M1:PRINTCH
    R$(145);
28  36 POKEM1,HB*16+LB:M1=M1+1:CH
    =CH+HB+LB:IFM1<M2THEN32
82  37 IFCH=79951THEN39
13  38 PRINT"CHECK SUM ERROR - CH
    ECK DATA STATEMENTS!":PRINTCH
    R$(19):END
EC  39 PRINT"  HIT RETURN TO SAVE
     COMPLETED PROGRAM"
D1  40 GETKEY$:IFKEY$<>CHR$(13)TH
    EN40
70  41 SYS38864
10  42 :
CE  43 ::::::::::::::::::: DATUM S
    TATEMENTS ::::::::::::::::
16  44 :
AD  45 DATA 00,08,09,00,00,9E,32,
    30,36,31,00,00,00,20,44,E5
2D  46 DATA A9,0C,8D,20,D0,8D,21,
    D0,EA,A9,36,85,01,4C,E7,1E
64  47 DATA A9,0D,20,D2,FF,E8,E0,
    05,D0,F8,A9,1B,A0,18,20,1E
1E  48 DATA AB,20,E4,FF,C9,85,F0,
    0F,C9,88,F0,0B,AD,20,D0,49
90  49 DATA 03,8D,20,D0,4C,31,08,
    A2,0F,8E,20,D0,C9,85,F0,1F
79  50 DATA 4C,30,18,EA,04,86,20,
    F2,08,4C,72,08,20,47,0A,4C
03  51 DATA 00,08,20,A4,08,4C,72,
    08,20,00,0E,4C,00,08,20,0B
BD  52 DATA 09,20,E4,FF,F0,FB,4C,
    00,08,D0,40,2C,A9,AF,C8,20
14  53 DATA D2,FF,C0,23,D0,F8,60,
    20,0C,E5,A9,B4,20,D2,FF,E8
CE  54 DATA E0,15,D0,F3,60,20,0C,
    E5,A9,AA,20,D2,FF,E8,E0,15
01  55 DATA D0,F3,60,A0,03,A2,17,
    20,0C,E5,20,CF,FF,48,C9,4E
81  56 DATA D0,2A,A9,5C,A0,13,85,
    FC,84,FD,A9,29,A0,06,85,FE
10  57 DATA 84,FF,A9,EC,A0,05,85,
    90,84,93,20,00,0D,20,CE,0E
D2  58 DATA A9,29,20,A8,FF,A9,05,
    20,A8,FF,90,03,20,E8,0D,68
CA  59 DATA D0,03,20,CF,FF,C9,0D,
    F0,05,20,A8,FF,90,F4,4C,AE
01  60 DATA FF,A0,03,A2,17,20,0C,
    E5,20,AE,0D,20,A5,FF,C9,0D
FD  61 DATA F0,05,20,D2,FF,D0,F4,
    4C,AE,FF,20,2A,09,20,50,09
E5  62 DATA D0,07,20,72,09,A0,02,
    D0,F4,20,AE,FF,A9,08,20,B1
3D  63 DATA FF,A9,E0,20,93,FF,4C,
    AE,FF,20,44,E5,A9,08,20,B1
B6  64 DATA FF,A9,F0,20,93,FF,A9,
    24,20,A8,FF,20,AE,FF,A9,08
73  65 DATA 20,B4,FF,A9,60,20,96,
    FF,A9,00,85,90,A0,03,60,84
6E  66 DATA B7,20,A5,FF,85,C3,20,
    A5,FF,85,C4,A4,90,D0,11,A4
6D  67 DATA B7,88,D0,EB,A6,C3,A5,
    C4,20,CD,BD,20,7F,09,A9,00
BA  68 DATA 60,20,A5,FF,F0,05,20,
    D2,FF,D0,F6,4C,84,09,A9,20
23  69 DATA 4C,D2,FF,A9,0D,4C,D2,
    FF,A5,60,C9,20,90,07,A9,0E
92  70 DATA A0,17,4C,1E,AB,A5,C4,
    F0,C7,A9,FD,A0,16,4C,1E,AB
A6  71 DATA A5,C3,C9,E5,B0,F3,A5,
    60,20,F1,09,A2,00,E8,BD,40
3B  72 DATA 03,C9,22,D0,F8,86,61,
    E8,BD,40,03,C9,22,F0,06,91
11  73 DATA 62,E8,C8,D0,F3,8A,A4,
    60,18,E5,61,99,14,18,A5,C3
5D  74 DATA 99,34,18,9D,40,03,D0,
    07,A9,1B,A0,17,4C,1E,AB,C9
93  75 DATA 53,F0,07,C9,50,F0,03,
    E8,D0,E9,99,54,18,E6,60,60
18  76 DATA A0,00,0A,CA,84,63,0A,
    26,63,0A,26,63,85,62,A5,62
4F  77 DATA 18,69,E6,85,62,A5,63,
    69,18,85,63,60,A6,5F,BD,14
F2  78 DATA 18,85,61,8A,20,F1,09,
    81,62,20,D2,FF,99,40,03,C8
D3  79 DATA C4,61,D0,F3,A2,03,BD,
    47,17,99,40,03,C8,CA,10,F6
23  80 DATA A6,5F,BD,54,18,99,3D,
    03,60,85,D5,98,A2,40,A0,03
82  81 DATA 20,BD,FF,4C,D5,F3,A9,
    00,85,60,20,2A,05,20,50,05
1E  82 DATA 20,72,09,20,84,09,A0,
    02,20,50,09,A0,00,20,A5,FF
67  83 DATA F0,09,20,D2,FF,99,40,
    03,C8,D0,F2,20,A5,FF,20,A5
5D  84 DATA FF,A5,90,D0,3B,A9,00,
    85,0B,A9,1E,85,D3,A9,CA,A0
D4  85 DATA 16,20,1E,AB,20,E1,FF,
    D0,03,4C,1A,09,20,E4,FF,C9
12  86 DATA 4E,F0,13,C9,59,D0,ED,
    A9,D5,A0,16,20,1E,AB,20,89
5D  87 DATA 39,A0,01,4C,59,0A,A9,
    E9,A0,16,20,1E,AB,4C,A2,0A
0E  88 DATA 20,1A,09,A5,60,D0,01,
    60,A2,00,86,5F,A9,4B,A0,17
62  89 DATA 20,1E,AB,20,AE,0B,E0,
    03,A9,00,2C,A9,01,85,5D,A2
C8  90 DATA 00,86,5E,A6,5F,A9,FF,
    9D,74,18,A9,22,9D,95,18,A9
7A  91 DATA 2F,A0,17,20,1E,AB,A6,
    5F,BD,74,18,85,AE,BD,95,18
75  92 DATA 85,AF,20,0D,0A,A9,00,
    20,3A,0A,20,DE,0B,90,17,20
48  93 DATA 84,09,20,F9,08,A6,5F,
    A9,00,9D,14,18,BD,74,18,85
53  94 DATA AE,BD,95,18,85,AF,A6,
    5F,E8,38,A5,AE,9D,74,18,A5
03  95 DATA AF,9D,95,18,7D,34,18,
    B0,0A,E4,60,B0,06,E6,5F,E6
AC  96 DATA 5E,D0,AC,38,A5,5E,85,
    5C,A5,5F,E5,5E,85,5F,20,CA
B5  97 DATA 0B,A6,5F,BD,14,18,F0,
    35,A9,38,A0,17,20,1E,AB,20
9D  98 DATA 0D,0A,A9,57,99,3F,03,
    A6,5F,BD,74,18,85,AC,BD,95
B2  99 DATA 18,85,AD,BD,75,18,85,
    AE,BD,96,18,85,AF,A9,01,20
EB  100 DATA 3A,0A,20,87,0C,90,05
    ,20,84,09,20,F9,08,C6,5E,30
A5  101 DATA 09,E6,5F,A5,5D,F0,8A
    ,D0,B5,20,A4,0B,90,06,A5,5C
0A  102 DATA 85,5E,10,9F,E6,5F,A5
    ,5F,C5,60,B0,06,20,C1,0B,4C
BF  103 DATA D0,0A,60,A9,80,A0,17
    ,20,1E,AB,20,E1,FF,D0,04,68
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22  104 DATA 68,18,60,20,E4,FF,C9
        ,85,F0,F7,C9,86,D0,EC,38,60
3C  105 DATA A9,B5,A0,17,20,1E,AB
        ,F0,07,A9,D3,A0,17,20,1E,AB
4D  106 DATA 20,E1,FF,F0,DA,20,E4
        ,FF,C9,0D,D0,F4,60,A9,41,A0
70  107 DATA 0F,85,FC,84,FD,A9,00
        ,A0,04,85,FE,84,FF,A9,51,A0
65  108 DATA 05,85,90,84,93,20,00
        ,0D,A9,C5,20,A8,FF,A9,04,20
16  109 DATA A8,FF,20,AE,FF,78,20
        ,7C,0D,10,03,4C,76,0C,08,20
A7  110 DATA 7C,0D,28,D0,0C,A4,CA
        ,B6,A4,0B,68,09,40,48,28,70
13  111 DATA 05,D8,A9,FE,85,A4,A0
        ,00,AD,02,DD,C9,C8,8D,00,DD
BE  112 DATA AD,0D,DD,10,FB,AD,0C
        ,DD,29,03,8D,0C,DD,A2,0A,CA
CF  113 DATA D0,FD,A2,04,AD,00,DD
        ,0A,2A,66,90,4A,66,90,EA,CA
1E  114 DATA D0,F2,A5,90,A2,34,86
        ,01,91,AE,A2,37,86,01,C8,D0
47  115 DATA E1,08,18,A5,A4,65,AE
        ,85,AE,90,02,E6,AF,28,70,03
53  116 DATA 4C,07,0C,A9,00,A8,20
        ,CE,0E,A9,40,85,90,98,10,03
B4  117 DATA 4C,33,F6,4C,2B,F5,A9
        ,92,A0,10,85,FC,84,FD,A9,00
F5  118 DATA A0,04,85,FE,84,FF,A9
        ,CA,A0,06,85,90,84,93,20,00
9C  119 DATA 0D,AD,00,DD,29,23,85
        ,93,A9,F6,20,A8,FF,A9,05,20
A4  120 DATA A8,FF,20,AE,FF,78,A9
        ,00,85,FE,20,56,0D,20,7C,0D
0E  121 DATA 30,24,A0,00,A9,34,85
        ,01,B1,AC,48,45,FE,85,FE,A9
B4  122 DATA 37,85,01,68,20,CF,0D
        ,20,DB,FC,CA,D0,E5,A5,FE,20
1A  123 DATA CF,0D,70,06,50,DC,30
        ,08,10,DB,20,CF,0D,20,7C,0D
45  124 DATA 08,20,CE,0E,A9,00,85
        ,90,28,10,02,38,60,18,60,20
AE  125 DATA C2,0D,A9,57,20,A8,FF
        ,A5,FE,20,A8,FF,A5,FF,20,A8
70  126 DATA FF,A9,1E,20,A8,FF,A0
        ,00,B1,FC,20,A8,FF,C8,C0,1E
FE  127 DATA 90,F5,20,AE,FF,18,A5
        ,FC,69,1E,85,FC,90,03,E6,FD
09  128 DATA 18,A5,FE,A6,FF,69,1E
        ,85,FE,90,02,E6,FF,E4,93,90
D2  129 DATA BE,C5,90,90,BA,AD,11
        ,D0,29,EF,8D,11,D0,20,C2,0D
C0  130 DATA A9,45,4C,A8,FF,38,A5
        ,A5,E5,AC,AA,A0,A5,AF,E5,AC
18  131 DATA D0,C9,E0,FF,B0,04,C9
        ,98,D0,07,A2,F5,A9,00,38,F0
D3  132 DATA 07,09,09,09,40,48,28
        ,98,4C,CF,0D,AD,00,DD,29,03
C6  133 DATA 09,28,8D,00,DD,AD,0D
        ,DD,10,FB,AD,00,DD,29,03,8D
42  134 DATA 00,DD,A0,05,88,EA,D0
        ,FC,A0,04,AD,00,DD,0A,2A,66
C1  135 DATA 90,4A,66,90,EA,88,D0
        ,F2,A5,90,45,FF,60,A9,00,20
03  136 DATA D4,FF,A9,0F,4C,95,FF
        ,A9,08,20,B1,FF,A9,0F,4C,93
33  137 DATA FF,20,C8,0D,A0,4D,20
        ,A8,FF,A9,2D,4C,A8,FF,85,90
F0  138 DATA AD,00,DD,29,03,09,08
        ,8D,00,DD,AD,00,DD,10,FD,AD
70  139 DATA 00,DD,29,03,80,00,DD
        ,A0,04,A5,93,46,90,6A,46,90
0A  140 DATA 6A,4A,4A,8D,00,DD,88
        ,D0,F0,A0,01,88,D0,FD,60,20
98  141 DATA 44,E5,A9,1F,A0,14,85
        ,FC,84,FD,A9,00,A0,04,85,FE
0E  142 DATA 85,44,84,FF,A9,AC,A0
        ,05,85,90,84,93,20,00,0D,20
6A  143 DATA 34,0F,20,CE,0E,20,C1
        ,08,20,46,0D,A9,45,20,A8,FF
78  144 DATA A9,04,20,B9,0E,20,DE
        ,0E,D0,18,A2,CC,20,7C,0D,9D
7E  145 DATA 14,18,E8,D0,F7,A0,00
        ,34,01,B9,14,18,91,42,C8,D0
C3  146 DATA F0,A9,37,85,01,E6,43
        ,C6,45,D0,DA,20,CE,0E,20,CA
0C  147 DATA 0E,20,46,0D,A9,7E,20
        ,A8,FF,A9,04,20,D9,0E,A0,00
F6  148 DATA 84,01,B1,42,99,14,18
        ,C8,D0,F8,A9,37,85,01,A2,C0
95  149 DATA BD,14,18,20,CF,0D,E8
        ,D0,F7,E6,43,20,DE,0E,C6,45
35  150 DATA D0,DC,20,CE,0E,20,A4
        ,0D,B0,C4,E6,44,A5,44,C9,03
C0  151 DATA F0,03,4C,26,0E,20,45
        ,0D,4C,34,0F,A5,44,A2,E4,C9
23  152 DATA 02,90,01,CA,86,45,8A
        ,E0,20,A8,FF,20,AE,FF,78,A9
1E  153 DATA 19,85,43,A9,14,85,42
        ,20,AC,0E,4C,CF,0D,A9,03,8D
2A  154 DATA 00,DD,AD,11,D0,09,10
        ,8D,11,D0,58,18,60,20,7C,0D
51  155 DATA 10,F9,29,7F,20,04,0F
        ,8E,06,18,8D,07,18,20,7C,0D
AD  156 DATA 20,04,0F,8E,11,18,8C
        ,12,18,A9,F5,A0,17,20,1E,AB
28  157 DATA 79,38,6C,48,4A,04,EB
        ,F0,AA,F0,08,18,A8,C0,69,16
11  158 DATA CA,D0,F8,05,40,D8,68
        ,29,CF,C9,CA,90,02,69,05,F8
34  159 DATA 65,40,D8,48,4A,04,E8
        ,C9,30,AA,68,25,CF,C9,30,A8
9C  160 DATA 60,A9,22,20,A8,FF,A9
        ,ED,20,A8,FF,4C,AE,FF,A9,03
A2  161 DATA 85,31,20,0A,F5,50,FE
        ,D8,AD,01,1C,91,30,C8,D0,F5
D2  162 DATA A0,BA,50,FE,B8,AD,01
        ,1C,99,00,01,C8,D0,F4,20,EC
ED  163 DATA F8,A5,38,C5,47,F0,03
        ,4C,FE,F4,20,E9,F5,C5,3A,F0
81  164 DATA 03,4C,02,F5,AD,00,03
        ,20,8A,04,AD,01,03,20,8A,04
39  165 DATA AC,03,20,00,18,10,F0
        ,A9,10,8D,00,18,20,00,18,30
3E  166 DATA FC,89,00,03,49,FF,85
        ,0F,A2,04,A9,00,46,0F,2A,0A
49  167 DATA 46,0F,2A,0A,8D,00,18
        ,CA,D0,FC,C8,EA,EA,D0,E2,A9
E8  168 DATA 0F,8D,00,18,AD,01,03
        ,85,09,AD,00,03,C5,08,D0,C3
02  169 DATA 4C,04,04,85,08,4C,18
        ,F4,85,0F,20,00,18,10,FB,A9
C0  170 DATA 10,8D,00,18,20,00,18
        ,30,FB,A2,04,A9,00,46,0F,2A
09  171 DATA 0A,46,0F,2A,0A,8D,00
        ,18,CA,D0,FC,AD,01,CA,D0,FD
D3  172 DATA EA,EA,A9,0F,8D,00,18
        ,60,85,C1,58,A5,01,30,FC,78
C3  173 DATA C9,02,50,78,A5,18,C9
        ,12,D0,05,A9,62,4C,3E,05,85
92  174 DATA 08,A5,19,85,09,A9,00
        ,85,06,85,07,85,10,85,0D,A2
39  175 DATA 04,A9,E0,20,BA,04,90
        ,05,CA,D0,F6,B0,07,A9,E0,20
C5  176 DATA BA,04,90,2C,A5,10,F0
        ,0D,C6,10,A9,C0,20,BA,04,A9
7E  177 DATA 00,85,06,85,07,A4,06
        ,B9,DB,FE,FC,21,A5,07,38,F9
AE  178 DATA D8,FE,85,07,89,D6,FE
        ,58,20,76,D6,78,EE,06,D0,EF
D3  179 DATA A5,07,58,20,76,D6,78
        ,A5,08,D0,AA,FC,1F,A5,0D,D0
71  180 DATA 05,E6,10,E6,0D,D0,A8
        ,48,09,80,20,8A,04,68,C9,62
FD  181 DATA D0,03,20,C8,C1,A2,01
        ,A5,01,20,CA,E6,4C,94,C1,A5
41  182 DATA 44,4A,05,E6,AA,ED,C5
        ,C6,85,69,AC,04,CA,D2,01,C8
06  183 DATA 84,07,A9,00,85,06,20
        ,E7,04,FC,0E,85,81,85,C7,AA
D1  184 DATA E8,86,0E,A9,00,85,80
        ,F0,0C,20,54,C5,B0,05,A9,72
6A  185 DATA 4C,69,F9,A9,00,20,17
        ,C5,A5,80,8D,00,03,A5,81,8D
0C  186 DATA 01,03,A9,03,85,31,A0
        ,02,20,E7,04,91,30,C8,C4,0E
81  187 DATA DC,F6,20,E7,04,A6,06
        ,9D,00,02,A5,09,9D,15,02,85
E1  188 DATA 08,20,50,01,E6,0C,A5
        ,C7,DC,0E,A5,81,05,09,A5,8C
7C  189 DATA C5,08,D0,04,E6,06,D0
        ,9E,A9,00,85,09,20,0A,F5,50
52  190 DATA FE,B8,AD,01,1C,91,30
        ,CB,D0,F5,B4,CA,A0,EA,5C,FE
1A  191 DATA B8,AD,01,1C,99,00,01
        ,C8,D0,F4,20,E0,FB,A6,C6,BD
C7  192 DATA 15,02,C5,09,F0,05,CA
        ,10,F6,30,1A,A5,0E,A4,09,C4
09  193 DATA 0B,D0,02,85,0A,A0,02
        ,BD,00,02,51,30,C8,C4,0A,D0
59  194 DATA F9,C9,00,D0,1C,18,A5
        ,09,65,07,C5,43,85,09,90,AC
DC  195 DATA E5,43,85,09,D0,A6,A5
        ,80,85,08,A5,81,85,09,4C,18
D5  196 DATA F4,4C,C5,F6,2C,00,18
        ,10,FB,A9,10,8D,00,18,2C,00
C6  197 DATA 18,30,FB,A2,04,CA,D0
        ,FD,BE,00,18,A2,04,AD,00,18
D3  198 DATA 4A,08,4A,4A,66,CF,28
        ,66,0F,CA,D0,F1,A9,CF,8D,00
49  199 DATA 18,A5,0F,60,95,0F,20
        ,00,18,10,FB,A9,10,8D,0C,18
14  200 DATA 2C,00,18,30,FB,A2,04
        ,A9,00,46,0F,2A,CA,46,0F,2A
58  201 DATA 0A,8D,00,18,CA,D0,F0
        ,A2,01,CA,D0,FD,EA,EA,A9,0F
E8  202 DATA 8D,30,18,60,A9,E0,85
        ,31,58,A5,01,30,FC,78,C9,02
76  203 DATA 60,A9,03,85,CD,20,CD
        ,05,D0,30,A5,80,C9,12,F0,16
BE  204 DATA 90,15,E6,80,A5,60,C9
        ,24,D0,E8,A2,11,86,80,A9,00
D3  205 DATA 85,81,C5,0D,D0,DF,18
        ,6C,C6,80,D0,D9,A2,13,86,80
D6  206 DATA A9,00,85,81,C6,0D,D0
        ,CD,F0,EC,A5,81,18,65,69,85
5E  207 DATA 81,A5,80,20,4B,F2,8D
        ,4E,02,C5,81,B0,0C,38,A5,81
4E  208 DATA ED,4E,02,95,81,F0,02
        ,C6,81,20,D7,05,D0,09,A9,00
56  209 DATA 85,81,20,D7,05,F0,BF
        ,E1,6D,5D,E9,EF,51,6D,A0,00
1F  210 DATA B1,5D,38,E9,01,91,6D
        ,38,60,A5,80,0A,0A,85,6D,A0
C3  211 DATA 00,91,6D,60,A0,20,84
        ,6F,A5,80,20,4E,F2,8D,4E,02
E5  212 DATA A5,81,CD,4E,02,B0,09
        ,20,D5,EF,D0,06,E6,81,D0,F0
2A  213 DATA A9,00,60,20,42,D0,20
        ,AB,06,78,F0,0F,AD,00,1C,29
C2  214 DATA 10,D0,04,A9,08,D0,50
        ,A9,E3,D0,4C,A0,01,B1,B6,F0
CE  215 DATA F6,85,08,85,80,C8,B1
        ,B6,85,09,85,81,A2,E3,BD,75
CA  216 DATA F5,9D,50,01,CA,10,F7
        ,A9,60,8D,B4,01,E0,85,0E,86
BD  217 DATA C7,86,0C,20,CC,05,20
        ,D7,05,20,EA,05,A2,04,A9,E0
0F  218 DATA 20,49,05,90,05,CA,D0
        ,F6,B0,0B,20,47,05,B0,0E,A5
7A  219 DATA C7,F0,E8,D0,1A,C9,72
        ,48,F0,03,20,E7,04,09,80,20
4F  220 DATA 17,05,68,C9,63,50,05
        ,A2,01,20,0A,E6,20,C8,C1,20
49  221 DATA E7,04,A9,00,20,17,05
        ,58,20,A8,06,B1,86,C9,80,91
00  222 DATA 86,A0,1C,A5,0C,91,86
        ,A9,90,20,A0,06,A9,12,85,0E
DE  223 DATA A9,90,A2,04,20,A2,06
        ,20,42,D0,4C,94,C1,A2,00,20
05  224 DATA 7D,D5,4C,99,D5,A0,61
        ,02,85,07,A9,12,85,06,A9,80
08  225 DATA 20,A0,06,A9,03,85,87
        ,AD,67,02,85,86,A0,00,B1,86
53  226 DATA 29,80,60,09,0A,0A,05
        ,20,E5,C1,D0,05,A9,34,4C,C8
2B  227 DATA C1,8C,7A,02,A9,A0,20
        ,68,C2,20,03,C1,AC,7B,02,CC
A6  228 DATA 74,02,D0,03,4C,46,EE
        ,B9,00,02,85,12,B9,01,02,85
46  229 DATA 13,A2,00,BD,C7,FA,9D
        ,00,C4,E8,EC,45,D0,F5,A2,C0
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4D 230 DATA ED,DA,06,9D,45,04,E8
       ,EC,0E,D0,F5,A2,00,BD,36,FC
1A 231 DATA 9D,53,01,E8,E0,F1,D0
       ,F5,A2,00,BD,BC,FD,9D,44,05
91 232 DATA E8,E0,18,D0,F5,A2,00
       ,BD,0E,FE,9D,50,01,E8,E0,22
08 233 DATA D0,F5,A9,27,8D,BC,04
       ,8D,A7,04,A9,50,A2,01,8D,CC
01 234 DATA 04,8E,CD,04,A9,04,8D
       ,65,01,A9,01,85,9C,A9,4C,A2
9C 235 DATA 00,AC,04,8D,00,06,8E
       ,01,06,8C,02,06,A9,03,20,D3
A4 236 DATA D6,A9,E0,85,03,A5,03
       ,30,FC,C9,02,90,05,A2,03,4C
E8 237 DATA 0A,E6,20,05,F0,4C,56
       ,EE,A5,44,4A,05,B3,AA,BD,EB
5B 238 DATA 06,8D,26,06,08,08,10
       ,07,20,61,05,A5,01,29,04,D0
14 239 DATA 1F,20,50,01,F0,00,A5
       ,09,20,DA,04,A0,00,B9,00,03
27 240 DATA 20,BA,04,C8,D0,F7,20
       ,27,05,F0,02,90,E4,4C,05,F5
CF 241 DATA A0,00,20,EA,04,99,00
       ,03,C8,D0,F7,20,50,01,A5,09
2A 242 DATA 20,BA,04,20,27,05,F0
       ,02,90,E6,4C,05,F5,20,7E,05
09 243 DATA A2,38,BD,D1,F4,9D,50
       ,01,CA,10,F7,A9,60,8D,84,01
71 244 DATA 20,1A,05,A9,E0,A2,01
       ,86,F5,20,7D,05,A9,FF,8D,98
01 245 DATA 02,5B,20,99,D5,79,A5
       ,01,C9,02,90,C3,20,73,05,A5
15 246 DATA C5,D0,DD,4C,22,EB,20
       ,90,05,A2,64,BD,75,F5,9D,50
7C 247 DATA 01,CA,10,F7,A9,60,8D
       ,84,01,A2,04,20,1A,05,90,03
12 248 DATA CA,D0,F8,A9,E4,20,1C
       ,05,90,C3,20,73,05,A5,C5,D0
E3 249 DATA EB,A5,0B,8D,AA,05,A5
       ,09,8D,AB,05,4C,22,EB,A5,0B
43 250 DATA 09,80,85,0F,2C,00,18
       ,10,FB,A9,10,8D,00,18,2C,00
6D 251 DATA 18,30,FB,A2,04,A9,00
       ,46,0F,2A,0A,46,0F,2A,0A,8D
F4 252 DATA 00,18,CA,D0,F0,A2,01
       ,CA,D0,FD,EA,EA,A9,0F,8D,00
81 253 DATA 18,50,2C,00,18,10,FB
       ,A9,10,8D,00,18,2C,00,18,30
E2 254 DATA FB,A2,04,CA,D0,FD,8E
       ,00,18,A2,04,AD,00,18,4A,08
14 255 DATA 4A,4A,66,0F,28,66,0F
       ,CA,D0,F1,A9,0F,8D,00,18,A5
0E 256 DATA 0F,60,A9,E0,85,01,58
       ,A5,01,30,FC,78,C9,02,60,A6
78 257 DATA 09,E8,A5,43,C9,12,D0
       ,06,E4,43,F0,06,D0,11,E4,C3
D0 258 DATA 20,0D,A5,0A,C9,23,F0
       ,02,E6,09,A9,00,38,FC,15,18
0E 259 DATA A5,09,65,C3,C5,43,90
       ,0C,E5,43,AA,A5,43,C9,12,D0
C5 260 DATA C1,E8,0A,19,85,09,C6
       ,C5,60,A5,44,4A,05,E8,AA,BD
D4 261 DATA A4,05,85,C3,A9,03,85
       ,31,60,20,E6,04,A5,09,20,BA
9D 262 DATA 04,4C,27,05,AD,AE,05
       ,8D,A9,C5,85,09,AD,AA,05,8D
95 263 DATA A9,C5,85,0B,D0,0A,AD
       ,A9,05,85,0B,AD,A9,05,85,09
53 264 DATA 20,19,C1,78,20,EA,04
       ,85,C5,60,09,09,0A,0E,01,0C
E3 265 DATA 01,00,93,90,0D,03,BB
       ,20,0B,BE,90,12,75,60,10,BE
AC 266 DATA 09,0D,20,0B,BC,12,7D
       ,20,10,EB,7D,0D,20,0B,BE,12
D0 267 DATA 7D,20,54,55,52,42,4F
       ,20,43,52,55,4E,43,48,45,52
75 268 DATA 20,7D,0D,20,0B,BE,12
       ,7D,20,10,BB,7D,0D,20,0B,EB
F2 269 DATA 12,7D,20,20,42,59,20
       ,4C,45,53,20,41,4C,4C,41,4E
4D 270 DATA 20,20,7D,0D,20,0B,BB
       ,12,7D,20,10,BB,7D,0D,20,0B
79 271 DATA BB,12,6A,60,10,BB,6B
       ,00,46,31,2E,04,BB,44,49,52
EC 272 DATA 45,43,54,4F,52,59,0D
       ,0D,46,37,2E,05,BB,43,52,55
29 273 DATA 4E,43,48,45,52,00,28
       ,59,45,53,2F,4E,4F,29,92,00
10 274 DATA 9D,08,BE,12,59,45,53
       ,92,20,05,BB,0D,00,9D,08,BE
D7 275 DATA 12,4E,4F,92,20,06,BB
       ,0D,00,12,46,49,4C,45,20,54
A4 276 DATA 4F,4F,20,4C,4F,4E,47
       ,92,0D,00,12,4C,49,53,54,20
F0 277 DATA 46,55,4C,4C,92,0D,00
       ,12,49,4C,4C,45,47,41,4C,20
5C 278 DATA 46,49,4C,45,54,59,50
       ,45,92,0D,00,0D,0D,52,45,41
CC 279 DATA 44,49,4E,47,1D,1D,00
       ,0D,0D,57,52,49,54,49,4E,47
0B 280 DATA 1D,1D,00,52,2C,50,2C
       ,0D,0D,12,20,46,31,20,92,1D
01 281 DATA 1D,43,4F,50,59,20,43
       ,4F,4E,54,49,4E,55,4F,55,53
93 282 DATA 4C,59,20,0D,12,20,46
       ,33,20,92,1D,1D,43,4F,50,59
E8 283 DATA 20,53,45,50,41,52,41
       ,54,45,4C,59,00,0D,0D,12,20
20 284 DATA 46,31,20,92,1D,1D,43
       ,4F,4E,54,49,4E,55,45,20,43
D5 285 DATA 4F,50,59,49,4E,47,0D
       ,0D,12,20,46,33,20,92,1D,1D
05 286 DATA 53,41,56,45,20,43,50
       ,46,46,45,52,20,41,47,41,49
99 287 DATA 4E,00,0D,0D,49,4E,53
       ,45,52,54,20,53,4F,55,52,43
8A 288 DATA 45,20,44,49,53,4E,20
       ,20,12,20,43,52,20,92,00,0D
10 289 DATA 0D,43,4E,53,45,52,54
       ,20,44,45,53,54,49,4E,41,54
8D 290 DATA 49,4F,4E,20,44,49,53
       ,4B,20,20,12,20,43,52,20,92
54 291 DATA 00,0D,20,45,52,52,4F
       ,52,20,4F,4E,20,54,52,41,43
49 292 DATA 4B,20,30,30,2C,20,53
       ,45,43,54,4F,52,20,30,30,00
9B 293 DATA 0F,05,20,C5,BB,95,20
       ,0B,BB,12,20,46,31,20,92,2E
B7 294 DATA C5,BE,44,49,52,45,43
       ,54,4F,52,59,00,04,BB,20,0E
AC 295 DATA BE,12,20,46,37,20,92
       ,2E,06,BE,43,52,55,4E,43,48
32 296 DATA 45,52,00,2D,A1,EE,78
       ,A2,FE,9A,20,18,E5,20,CE,0E
7C 297 DATA A9,00,8D,20,D0,8D,21
       ,D0,A9,05,8D,86,02,58,20,44
BA 298 DATA E5,A2,00,A0,02,20,0C
       ,E5,A9,CF,20,D2,FF,20,7A,0B
F6 299 DATA A9,D0,20,D2,FF,A2,15
       ,A0,02,20,0C,E5,A9,CC,20,D2
C1 300 DATA FF,20,7D,0B,A0,EA,20
       ,D2,FF,A2,01,A0,02,20,88,0B
4B 301 DATA A2,01,A0,24,20,95,0B
       ,A9,CD,A0,15,20,1E,AB,20,E4
C0 302 DATA FF,C9,85,F0,1C,C9,86
       ,F0,24,C9,87,F0,1A,C9,88,F0
95 303 DATA 0A,C9,89,D0,E9,20,F2
       ,0B,4C,72,0B,20,47,0A,4C,00
D8 304 DATA 08,20,A4,0B,4C,72,0B
       ,20,00,0E,4C,00,08,20,0E,C9
4F 305 DATA 20,E4,FF,F0,FB,4C,00
       ,08,A9,E7,2C,A9,AF,C8,20,D2
D9 306 DATA FF,C0,23,D0,F8,60,20
       ,0C,E5,A9,B4,20,D2,FF,E8,E0
91 307 DATA 15,D0,F3,60,20,0C,E5
       ,A9,AA,20,D2,FF,E8,E0,15,D0
D3 308 DATA F3,60,A0,03,A2,17,20
       ,0C,E5,20,CF,FF,48,C9,4E,D0
6B 309 DATA 2A,A9,5C,A0,13,85,FC
       ,84,FD,A9,29,A0,0B,85,FE,84
2E 310 DATA FF,A9,EC,A0,0E,85,90
       ,84,93,20,00,0D,20,CE,0E,A9
D0 311 DATA 29,20,A8,FF,A9,0E,20
       ,A8,FF,90,03,20,E8,0D,68,D0
9C 312 DATA 03,20,CF,FF,C9,0D,EA
       ,C8,E8,93,05,0D,0D,50,52,4F
E7 313 DATA 47,52,41,4D,20,4E,41
       ,4D,45,20,3A,00,0D,0D,50,52
47 314 DATA 4F,47,20,44,4F,45,53
       ,20,4E,4F,54,20,53,54,41,52
07 315 DATA 54,20,41,54,20,24,30
       ,38,3C,31,26,21,C0,CC,CD,45
5C 316 DATA 52,52,4F,52,00,0D,0D
       ,53,45,41,52,43,48,49,4E,47
E5 317 DATA 20,46,4F,52,20,41,20
       ,43,4F,44,45,C0,0D,0D,43,52
AD 318 DATA 55,4E,43,48,49,4E,47
       ,00,00,20,E4,FF,C9,88,F0,01
93 319 DATA 60,20,39,1C,58,68,4C
       ,0D,08,A9,CB,A0,1A,20,1E,AB
21 320 DATA 20,CF,FF,A2,01,C9,2A
       ,F0,F0,9D,3F,03,E8,E0,11,F0
EE 321 DATA 07,20,CF,FF,C9,0D,D0
       ,ED,A9,2C,9D,3F,03,E8,A9,50
CF 322 DATA 9D,3F,03,E8,A9,2C,9D
       ,3F,03,E8,86,B7,A9,52,9D,3F
A0 323 DATA 03,20,C1,0B,A9,00,A4
       ,B7,20,3A,CA,A9,FF,85,AE,A9
1A 324 DATA 22,85,AF,20,DE,09,90
       ,15,A9,FC,A0,1A,D0,04,A9,DB
B3 325 DATA A0,1A,20,1E,AB,20,E4
       ,FF,F0,FB,60,00,00,AD,FF,22
5E 326 DATA C9,01,D0,EA,AD,00,23
       ,C9,08,D0,E3,20,08,1D,A9,04
BF 327 DATA A0,19,20,40,1D,79,A9
       ,34,85,01,A9,23,85,FF,A9,01
1E 328 DATA 85,FE,AA,9D,00,1F,E8
       ,DC,FA,A8,B1,FE,AA,ED,00,1F
96 329 DATA C9,FF,F0,03,FE,00,1F
       ,20,FB,1B,90,EE,A9,FF,AA,85
1A 330 DATA FD,DD,00,1F,90,09,F0
       ,07,86,FD,BD,00,1F,F0,05,CA
3C 331 DATA E0,FF,D0,ED,85,FC,18
       ,90,13,85,07,E6,FE,D0,02,E6
E0 332 DATA FF,A5,FE,C5,AE,A5,FF
       ,E5,AF,A5,07,60,20,A8,1E,EA
41 333 DATA A9,18,A8,20,1E,A8,78
       ,A9,34,85,01,A9,20,85,FE,85
4A 334 DATA 2F,A9,23,85,FF,85,30
       ,A9,FD,8D,C2,1C,A9,21,8D,C3
B0 335 DATA 1C,EA,A5,FD,8D,A9,21
       ,8D,F9,21,A0,00,B1,FE,85,02
09 336 DATA C5,FD,D0,11,A9,8D,20
       ,C1,1C,A5,FE,20,C1,1C,A5,FF
55 337 DATA 20,4B,1E,D0,55,A2,01
       ,20,F8,1B,E0,3C,D1,FE,D0,38
AE 338 DATA E8,20,F8,1B,B0,32,D1
       ,FE,D0,2E,E8,20,F8,1B,E0,08
93 339 DATA E0,FF,F0,04,D1,FE,F0
       ,F2,A0,00,91,2F,C8,8A,91,2F
05 340 DATA C8,A5,FD,91,2F,A5,2F
       ,18,69,03,85,2F,90,02,E6,30
27 341 DATA EA,20,20,1C,90,A4,B0
       ,23,86,03,A5,FE,38,E5,03,85
6B 342 DATA FE,B0,02,C6,FF,A5,02
       ,18,90,04,A5,02,49,FF,91,2F
3C 343 DATA E6,2F,D0,02,E6,30,20
       ,F8,1B,90,81,A9,37,85,01,58
E7 344 DATA D0,0C,8D,06,22,EE,C2
       ,1C,D0,03,EE,C3,1C,60,4C,58
66 345 DATA 1D,0D,0D,50,52,4F,47
       ,52,41,4D,20,4C,45,4E,47,54
BF 346 DATA 48,20,3D,20,00,20,42
       ,4C,4F,43,4B,53,0D,00,04,BB
55 347 DATA A2,00,E9,A5,AE,38,E9
       ,FE,85,AE,A5,AF,E9,00,85,AF
DB 348 DATA A5,AF,C9,23,B0,EC,90
       ,00,20,2B,1D,86,04,90,05,20
EC 349 DATA 2B,1D,86,05,86,05,A9
       ,D0,A0,1C,20,1E,AB,A6,06,A9
20 350 DATA 00,20,CD,BD,A9,E4,A0
       ,1C,4C,1E,AB,A5,AE,48,A5,AF
13 351 DATA 48,20,F0,1C,68,85,AF
       ,68,85,AE,18,60,C0,04,BB,20
A7 352 DATA 1E,A8,A2,1F,BD,00,23
       ,9D,62,21,BD,00,21,9D,00,23
AA 353 DATA CA,D0,F1,60,00,03,B5
       ,A5,2F,8D,1E,23,A5,30,38,E5
DE 354 DATA 18,8D,1F,23,A8,A5,2F
       ,18,69,42,0D,23,21,98,69,00
CC 355 DATA 8D,24,21,A5,2F,18,69
       ,A9,8D,2E,21,98,EA,69,00,8D
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D5  356 DATA 2F,21,A5,2F,CA,8E,4D
    ,21,98,E0,FF,D0,01,88,8C,51
A3  357 DATA 21,A5,AE,8D,3C,21,A5
    ,AF,38,E9,18,8D,45,21,EA,78
78  358 DATA A9,34,85,01,EA,0B,BB
    ,A9,4C,20,C1,1C,A9,AE,20,C1
8E  359 DATA 1C,A9,A7,20,C1,1C,A9
    ,20,85,02,A9,21,85,03,A0,00
6D  360 DATA B1,02,91,2F,E6,02,D0
    ,02,E6,03,E6,2F,D0,02,E6,30
1E  361 DATA A5,02.CD,C2,1C,A5,03
    ,ED,C3,1C,90,E4,A5,2F,85,AE
C7  362 DATA A5,30,85,AF,EA,EA.A9
    ,FF,85,AC,85,02,A9,22,85,AD
6E  363 DATA 85,03,A2,00,E8,A5,02
    ,18,69,FE,85,02,90,02,E6,03
7A  364 DATA A5,02,C5,AE,A5,03,E5
    ,AF,90,EA,20,98,1E,20,CA,0B
52  365 DATA A4,57,C8,A9,29,8D,3F
    ,03,A9,57,99,3F,C3,A9,01,85
24  366 DATA 59,9B,A2.3F,A0,03,20
    ,BD,FF,20,D5,F3,20,50,1E,90
FC  367 DATA 03,4C,87,1E,C6,E7,20
    ,A4,0B,B0,D2,60,00,03,BB,38
6A  368 DATA E9,18,4C,C1,1C,00,00
    ,A9,FF,85,AC,A9,22,85,AD,4C
6C  369 DATA 87,0C,00,05,BB,0D,0D
    ,4E,4F,20,53,41,56,49,4E,47
8E  370 DATA 20,4D,41,44,45,00,0D
    ,0D,43,41,4E,27,54,20,46,49
B6  371 DATA 4E,44,20,41,20,43,4F
    ,44,45,00,04,BB,A2,60,A0,1E
78  372 DATA D0,04,A2,71,A0,1E,68
    ,68,8A,4C,91,1E,A9,37,85,01
6C  373 DATA 58,20,12,1D,A5,05,C5
    ,04,80,E2,60,00,A9,37,85,01
D3  374 DATA 58,A5,FC,C9,3C,B0,DB
    ,60,00,4C,B5,FF,11,D8,ED,DC
A7  375 DATA D2,CA,73,80,38,FF,41
    ,2C,34,4A,4E,5C,4D,FF,3B,60
E3  376 DATA E0,FF,48,34,28,9E,8F
    ,47,21,82,43,39,1D,FF,E7,9C
0E  377 DATA 69,E1,66,7E,77,AC,5B
    ,1A,09,44,19,47,81,75,81,6A
FD  378 DATA 64,82,A7,89,25,44,47
    ,48,11,E7,29,64,66,6C,18,89
F9  379 DATA 30,87,9C,2D,23,77,38
    ,31,06,0B,05,0F,0E,E1,0A,13
CE  380 DATA 07,0E,19,1C,03,17,96
    ,35,07,16,33,0F,03,16,11,0E
71  381 DATA 04,09,05,0A,25,1A,0A
    ,15,05,12,1E,8E,2D,FF,FF,89
A0  382 DATA 8D,5C,FF,68,5E,D7,7D
    ,D5,4D,A3,FF,52,7C,97,7E,60
CB  383 DATA 62,42,4E,71,2C,77,67
    ,7C,7F,67,FF,43,3C,FF,14,8A
4D  384 DATA 69,3C,84,2A,09,62,FF
    ,F6,2E,31,FF,30,94,44,62,10
CF  385 DATA 09,10,09,10,07,0C,0F
    ,0A,09,13,D4,1E,3C,EA,0F,08
D8  386 DATA 1F,0E,0A,2E,0C,50,7F
    ,42,04,52,1C,4A,0F,FF,0D,19
71  387 DATA 06,68,08,0D,0D,15,09
    ,18,0E,24,13,1E,11,20,15,0C
61  388 DATA 13,0E,0F,2A,09,3C,43
    ,23,24,11,23,57,28,FF,12,16
3B  389 DATA 16,18,1D,31,1F,3C,28
    ,26,9D,E7,CD,A5,FF,C0,FF,B5
BE  390 DATA 00,00,0E,08,00,C0,9E
    ,32,30,36,31,00,03,EB,20,44
54  391 DATA E5,A9,0C,8D,20,D0,8D
    ,21,D0,EA,A9,36,85,01,4C,47
EC  392 DATA 08,A2,00,BD,51,AA,9D
    ,10,01,E8,D0,F7,A2,34,BD,E8
0F  393 DATA AA,9D,00,03,E8,D0,F7
    ,EA,EA,A2,FF,9A,A9,00,85,2D
C9  394 DATA 38,E9,01,85,FE,A9,D4
    ,85,2E,E9,00,85,FF,A9,0E,85
C4  395 DATA FC,A9,AA,85,FD,AD,21
    ,D0,85,FB,4C,52,01,00,07,BB
6F  396 DATA 0E,08,FF,FF,9E,32,30
    ,36,31,4C,45,53,00,0B,BB,21
0D  397 DATA 23,25,22,24,26,27,00
    ,48,C6,FC,A5,FC,C9,FF,D0,02
6A  398 DATA C6,FD,68,60,48,AD,20
    ,D0,49,03,8D,20,D0,C6,FE,A5
76  399 DATA FE,C9,FF,D0,02,C6,FF
    ,68,60,A0,00,B1,FC,C9,6F,D0
84  400 DATA 18,EA,03,DB,20,30,01
    ,B1,FC,AA,20.30,01,B1,FC,91
40  401 DATA FE,20,3D,01,CA,D0,F8
    ,F0,05,91,FE,2C,3D,01,A6,FC
6F  402 DATA CA,86,FC,E0,FF,D0,02
    ,C6,FD,A5,FE,C9,1F,A5,FF,E9
F7  403 DATA 09,50,C8,A5,FB,8D,20
    ,D0,A9,37,85,01,20,60,A6,20
C3  404 DATA 8E,A6,A2,1F,BD,10,01
    ,9D,00,08,CA,D0,F7,A9,EF,4C
FA  405 DATA 34,03,00,03,BD,A2,27
    ,ED,1C,22,9D,E8,07,CA,10,F7
55  406 DATA 4C,E3,07,00,00,78,A2
    ,FB,9A,20,18,E5,20,C1,05,A0
58  407 DATA 2C,8D,20,D0,8D,21,D0
    ,A9,0E,8D,86,02,58,20,44,E5
7A  408 DATA A2,00,A0,03,20,0C,E5
    ,A9,CF,20,D2,FF,20,E4,FF,5E
4F  409 DATA EE,FF,BB,EE,FF,BB,EE
    ,FF,BB,EE,FF,BB,EE,FF,BB,EE
52  410 DATA FF,BB,EE,FF,BB,EE,FF
    ,BB,EE,FF,BB,EE,FF,BB,EE,FF
E9  411 DATA B5,EE,FF,B9,EE,D5,BB
    ,A2,CC,BD,29,1F,9D,10,01,EB
52  412 DATA D0,F7,A2,34,BD,90,1F
    ,9D,00,03,E8,D0,F7,EA,EA,A2
4F  413 DATA FF,9A,A9,00,85,2D,38
    ,E9,01,85,FE,A9,30,85,2E,E9
E4  414 DATA 00,85,FF,A9,E6,85,FC
    ,A9,1E,85,FD,AD,21,D0,85,FB
E7  415 DATA 4C,52,01,00,00,00,00
    ,00,00,00,0B,08,00,00,9E,32
FA  416 DATA 30,36,31,00,00,00,A9
    ,0F,8D,20,D0,A9,0C,8D,21,D0
54  417 DATA A9,C5,A0,15,20,1E,AB
    ,A2,00,48,C6,FC,A5,FC,C9,FF
0D  418 DATA D0,02,C6,FD,68,60,48
    ,AD,20,D0,49,03,8D,20,D0,C6
9F. 419 DATA FE,A5,FE,C9,FF,D0,02
    ,C6,FF,68,60,A0,00,B1,FC,C9
90  420 DATA B9,D0,19,EA,EA,EA,20
    ,30,01,B1,FC,AA,20,30,01,B1
A3  421 DATA FC,91,FE,20,3D,01,CA
    ,D0,FB,F0,05,91,FE,20,3D,01
CB  422 DATA A5,FC,CA,96,FC,E0,FF
    ,D0,02,C6,FD,A5,FE,C9,1F,A5
04  423 DATA FF,E9,09,E0,C8,A5,FB
    ,8D,20,D0,A9,37,85,01,20,60
4E  424 DATA A6,20,8E,A6,A2,1F,BD
    ,10,01,9D,00,08,CA,D0,F7,A0
5F  425 DATA B5,4E,34,03,4C,AE,A7
    ,EE,EE,EE,EE,EE,EE,EE,EE,EF
4C  426 DATA A9,00,A8,95,FB,85,FD
    ,A9,80,85,FC,A9,0B,85,FE,B1
EA  427 DATA FB,91,FD,C8,D0,F9,E5
    ,FC,E6,FE,A5,FC,C9,A0,D0,EF
09  428 DATA A9,0B,AA,A8,20,BA,FF
    ,A9,0E,A2,14,A0,98,20,BD,FF
52  429 DATA A9,01,85,2B,A9,09,95
    ,2C,A9,2B,A2,D0,A0,1F,20,D8
76  430 DATA FF,4C,66,FE,54,55,52
    ,42,4F,20,43,52,55,4E,43,48
9D  431 DATA 45,52,EE,EE,EE,E5,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE
8E  432 :
88  433 :
33  434 ::::::::::::::::::::::::::::
    ::::::::::::
AA  435 :  TURBO CRUNCHER    BY L
    ES ALLAN  :
D2  436 :  29 ATKINSON DRIVE  NEW
    PORT  IW  :
36  437 ::::::::::::::::::::::::::::
    ::::::::::::
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PROGRAM: ONE PART LOADER

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36  10 M1=32768:M2=35712:CH=0
97  11 PRINTCHR$(144)CHR$(147)
C8  12 POKE52,120:POKE56,120:POKE
    53280,15:POKE53281,12
94  13 PRINT
8F  14 PRINTSPC(8)CHR$(18)"[SU,S*
    22,SI]
26  15 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
84  16 PRINTSPC(8)CHR$(18)"[S-,SP
    C4]DATA  STATEMENT[SPC3,S-]
3C  17 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
E5  18 PRINTSPC(8)CHR$(18)"[S-]
    TO MEMORY  ROUTINE  [S-]
4A  19 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
22  20 PRINTSPC(8)CHR$(18)"[S-,SP
    C5]BY LES ALLAN[SPC5,S-]
50  21 PRINTSPC(8)CHR$(18)"[S-,SP
    C22,S-]
6C  22 PRINTSPC(8)CHR$(18)"[SJ,S*
    22,SK]
A0  23 PRINT:PRINTCHR$(155)
42  24 PRINT" THIS ROUTINE READS
    THE DATA STATEMENT,"
80  25 PRINT
17  26 PRINT" CONVERTS FROM  HEX
    TO BINARY AND POKES"
82  27 PRINT
C4  28 PRINT" CODE BACK  TO THE
    AREA OF MEMORY FROM"
84  29 PRINT
19  30 PRINT" WHICH  IT  WAS  PRE
    VIOUSLY  GENERATED."
59  31 PRINT:PRINT
D0  32 READCODE$
88  33 LB=ASC(RIGHT$(CODE$,1))-48
    :IFLB>9THENLB=LB-7
CF  34 HB=ASC(LEFT$(CODE$,1))-48:
    IFHB>9THENHB=HB-7
32  35 PRINTSPC(5)CHR$(5)"READING
     MEMORY BLOCK ...";M1:PRINTCH
    R$(145);
28  36 POKEM1,HB*16+LB:M1=M1+1:CH
    =CH+HB+LB:IFM1<M2THEN32
92  37 IFCH=31622THEN39
13  38 PRINT"CHECK SUM ERROR - CH
    ECK DATA STATEMENTS!":PRINTCH
    R$(19):END
EC  39 PRINT"  HIT RETURN TO SAVE
     COMPLETED PROGRAM"
D1  40 GETKEY$:IFKEY$<>CHR$(13)TH
    EN40
5B  41 SYS35376
10  42 :
CE  43 ::::::::::::::::::::: DATUM S
    TATEMENTS ::::::::::::::::::
16  44 :
F7  45 DATA 00,10,08,00,00,8B,41,
    B2,30,A7,9E,34,36,30,38,00
B9  46 DATA 00,00,50,51,DA,10,E0,
    61,F6,62,69,51,5D,59,53,51
D4  47 DATA C6,64,62,63,69,61,7D,
    60,64,6D,C6,64,62,63,69,60
B2  48 DATA 7D,50,63,68.C9,95,79,
    60,65,66,78,51,37,59,52.51
3C  49 DATA C8,F7,54,78,73,C1,43,
    84,92,92,92,92.92,92,92.92
65  50 DATA 92,92,92,92,92,92,92,
    92,92,92,92,92,92,92,92,92
92  51 DATA 92,92,92,92,99,51,0E,
    59,55,51,C8,F7,64,78,73,43
CA  52 DATA 8C,71,71,71,71,71,71,
    71,71,71,71,71,71,71,71,71
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27  53 DATA 71,71,71,71,71,71,71,
    71,71,71,71,71,71,8C,51,E9
93  54 DATA 59,54,51,C9,F7,64,78,
    73,43,8C,71,71,71;71,71,71
28  55 DATA 71,71,71,71,71,71,71,
    71,71,71,71,71,71,71,71,71
3D  56 DATA 71,71,71,71,71,71,8C,
    51,8C,59,57,51,C8,F7,64,78
D1  57 DATA 73,43,8C,71,71,71,1E,
    1F,14,71,01,10,03,05,71,01
CD  58 DATA 03,1E,16,03,10,1C,71,
    1C,10,1A,14,03,71,71,71,8C
6A  59 DATA 51,5B,58,55,51,C9,F7,
    64,78,73,43,8C,71,71,71,71
93  60 DATA 71,71,71,71,71,71,71,
    71,71,71,71,71,71,71,71,71
34  61 DATA 71,71,71,71,71,71,71,
    71,8C,51,62,58,59,51,C8,F7
0E  62 DATA 64,79,73,43,8C,71,71,
    71,71,71,71,71,71,71,71,71
50  63 DATA 71,71,71,71,71,71,71,
    71,71,71,71,71,71,71,71,71
E5  64 DATA 71,8C,51,0D,58,59,51,
    C8,F7,64,78,73,43,8C,71,71
08  65 DATA 71,05,03,18,05,05,14,
    1F,71,13,08,71,71,71,1D,14
DF  66 DATA 02,71,10,1D,1D,10,1F,
    71,71,71,8C,51,D4,58,5E,51
47  67 DATA C9,F7,64,79,73,43,8C,
    71,71,71,71,71,71,71,71,71
9E  68 DATA 71,71,71,71,71,71,71,
    71,71,71,71,71,71,71,71,71
8D  69 DATA 71,71,71,8C,51,FF,58,
    5A,51,C8,F7,64,78,73,43,8C
99  70 DATA 71,71,71,71,71,71,71,
    71,71,71,71,71,71,71,71,71
CC  71 DATA 71,71,71,71,71,71,71,
    71,71,71,71,71,8C,51,86,58
5E  72 DATA 5D,51,C8,F7,54,78,73,
    43,98,92,92,92,92,92,92,92
5E  73 DATA 92,92,92,92,92,92,92,
    92,92,92,92,92,92,92,92,92
23  74 DATA 92,92,92,92,92,9A,51,
    8E,58,5C,51,C8,68,C8,51,5F
98  75 DATA 58,5F,51,C8,73,CA,71,
    71,05,19,18,02,71,01,03,1E
26  76 DATA 16,03,10,1C,71,04,05,
    18,1D,18,05,08,71,10,1D,1D
8D  77 DATA 1E,06,02,71,10,71,02,
    18,1F,16,1D,14,73,51,6D,58
39  78 DATA 5E,51,C8,73,71,71,17,
    18,1D,14,71,05,1E,71,13,14
97  79 DATA 71,01,03,1E,15,04,12,
    14,15,71,17,03,1E,1C,71,71
90  80 DATA 05,19,14,71,1C,14,1C,
    1E,03,08,73,51,3B,58,41,51
2E  81 DATA C8,73,71,71,02,10,07,
    14,03,71,71,03,1E,04,05,18
50  82 DATA 1F,14,71,71,05,19,18,
    12,19,71,71,12,03,14,10,05
5D  83 DATA 14,15,71,05,19,03,14,
    14,73,51,C9,58,40,51,C8,73
07  84 DATA 71,71,02,14,01,10,03,
    10,05,14,71,17,18,1D,14,02
09  85 DATA 71,6B,71,71,1C,10,18,
    1F,71,1A,14,03,1F,71,10,1F
8C  86 DATA 15,71,13,1E,1E,05,73,
    51,CF,58,43,51,C8,51,9D,58
81  87 DATA 42,51,C9,73,71,71,18,
    17,71,05,19,14,1F,71,05,19
07  88 DATA 14,71,1C,10,18,1F,71,
    01,03,1E,16,03,10,1C,71,1A
50  89 DATA 02,71,12,03,04,1F,12,
    19,14,15,73,51,AE,58,45,51
81  90 DATA C8,73,71,71,05,19,14,
    71,71,1F,04,1C,13,14,03,71
A5  91 DATA 71,1E,17,71,71,13,1D,
    15,12,1A,02,71,04,02,14,15
63  92 DATA 71,18,02,71,1D,14,02,
    02,73,51,78,5A,44,51,C8,73
97  93 DATA 71,71,50,64,63,71,71,
    05,19,14,1F,71,71,71,05,19
26  94 DATA 14,71,71,71,1A,14,03,
    1F,71,71,17,18,1D,14,71,71
F7  95 DATA 12,10,1F,71,13,14,73,
    51,07,5A,47,51,C8,73,71,71
1D  96 DATA 10,01,01,14,1F,15,14,
    15,71,71,05,1E,71,71,05,19
C4  97 DATA 14,71,71,12,03,04,1F,
    12,19,14,15,71,71,01,03,1E
66  98 DATA 16,03,10,1C,73,51,D5,
    5A,46,51,C8,73,71,71,13,08
E8  99 DATA 71,71,05,19,14,71,71,
    02,18,1C,01,1D,14,71,71,04
34  100 DATA 02,14,71,1E,17,71,05
    ,19,18,02,71,04,05,18,1D,18
D2  101 DATA 05,08,73,51,C7,5A,49
    ,51,DA,93,79,60,68,66,78,E3
69  102 DATA 67,65,F6,63,65,51,F8
    ,5A,48,51,C8,73,C0,C0,C0,C0
9A  103 DATA C0,C0,C0,C0,C0,C0,C0
    ,73,51,86,5A,4B,51,C8,73,71
11  104 DATA 71,05,19,14,71,71,1C
    ,10,18,1F,71,71,01,03,1E,15
36  105 DATA 03,10,1C,71,71,1C,04
    ,02,05,71,13,14,71,12,03,04
6C  106 DATA 1F,12,19,14,15,73,51
    ,54,5D,4A,51,C8,73,71,71,06
20  107 DATA 18,05,19,71,71,76,05
    ,04,03,13,1E,71,12,03,04,1F
D0  108 DATA 12,19,14,03,76,71,12
    ,19,10,03,10,12,05,14,03,18
71  109 DATA 02,14,15,73,51,62,5D
    ,4D,51,C8,73,71,71,13,08,71
75  110 DATA 10,71,1D,18,16,19,05
    ,71,71,13,1D,04,14,71,02,12
76  111 DATA 03,14,14,1F,71,10,1F
    ,15,71,13,1D,04,14,71,10,1F
BE  112 DATA 15,73,51,30,5D,4C,51
    ,C8,73,71,71,16,03,14,08,71
41  113 DATA 71,17,1D,10,02,19,18
    ,1F,16,71,71,13,1E,03,15,14
FA  114 DATA 03,71,04,02,18,1F,16
    ,71,10,71,02,05,10,03,05,73
66  115 DATA 51,DE,5D,4F,51,C9,73
    ,71,71,1D,18,1F,14,71,1F,04
1F  116 DATA 1C,13,14,03,71,65,71
    ,71,71,71,71,71,71,71,71,71
F6  117 DATA 71,71,71,61,71,02,08
    ,02,71,63,61,67,60,73,51,EC
05  118 DATA 5D,4E,51,C9,73,71,71
    ,71,71,71,71,71,71,71,71,71
68  119 DATA 71,71,71,71,71,71,71
    ,71,71,71,71,71,71,71,71,71
23  120 DATA 71,71,71,71,71,71,71
    ,71,71,71,71,73,51,DA,5D,71
AC  121 DATA 51,C8,73,71,71,05,19
    ,14,71,12,03,04,1F,12,19,14
7A  122 DATA 15,71,17,18,1D,14,71
    ,76,7A,1C,10,18,1F,76,71,10
AC  123 DATA 1F,15,71,76,1A,14,03
    ,1F,76,73,51,48,5C,70,51,C8
E1  124 DATA 73,71,71,17,18,10,14
    ,71,71,1C,04,02,05,71,71,13
F1  125 DATA 14,71,71,03,14,02,18
    ,15,14,1F,05,71,1E,1F,71,05
A7  126 DATA 19,14,71,15,18,02,1A
    ,73,51,16,5C,73,51,C8,73,71
84  127 DATA 71,06,18,05,19,71,71
    ,10,05,71,71,1D,14,10,02,05
98  128 DATA 71,63,51,63,71,13,1D
    ,1E,12,1A,02,71,10,07,10,18
19  129 DATA 1D,10,13,1D,14,73,51
    ,24,5C,72,51,C8,73,71,71,05
63  130 DATA 1E,71,71,02,10,07,14
    ,71,05,19,14,71,17,18,1F,18
80  131 DATA 02,19,14,15,71,01,03
    ,1E,16,03,10,1C,71,18,1F,71
C1  132 DATA 1E,1F,14,73,51,D6,5C
    ,75,51,DA,93,79,60,68,66,78
4E  133 DATA E3,67,65,F6,62,67,51
    ,F1,5C,74,51,DA,10,E3,61,F6
F9  134 DATA 10,E3,60,68,C2,73,1C
    ,14,1C,62,73,7D,69,7D,60,51
08  135 DATA E3,5C,77,51,DA,93,79
    ,60,68,6E,78,E3,67,65,F6,62
00  136 DATA 69,51,EF,5C,76,51,C8
    ,96,79,60,65,66,78,51,88,5C
2A  137 DATA 79,51,C8,73,71,71,71
    ,71,71,18,1F,02,05,03,04,12
16  138 DATA 05,18,1E,1F,02,71,17
    ,1E,03,71,1E,1F,14,71,01,10
8B  139 DATA 03,05,71,02,10,07,14
    ,73,51,4D,5F,78,51,C8,6B,C8
55  140 DATA 6B,C8,73,60,7F,71,12
    ,03,04,1F,12,19,71,1C,10,18
89  141 DATA 1F,71,17,18,1D,14,71
    ,04,02,18,1F,16,71,05,04,03
E3  142 DATA 13,1E,71,12,03,04,1F
    ,12,19,14,03,51,1C,5F,7B,51
8C  143 DATA C8,6B,C8,73,63,7F,71
    ,05,03,10,1F,02,17,14,03,71
1B  144 DATA 76,7A,1C,10,18,1F,76
    ,71,77,71,76,1A,14,03,1F,76
CA  145 DATA 71,05,1E,71,1F,14,06
    ,71,15,18,02,1A,51,2A,5F,7A
2B  146 DATA 51,C8,6B,C8,73,62,7F
    ,71,1C,10,1A,14,71,02,04,03
79  147 DATA 14,71,05,19,10,05,71
    ,63,61,63,71,13,1D,1E,12,1A
56  148 DATA 02,71,10,03,14,71,17
    ,03,14,14,51,C9,5F,7D,51,C8
90  149 DATA 6B,C8,6B,C8,73,65,7F
    ,71,1D,1E,10,15,71,76,1C,14
78  150 DATA 1C,62,76,7D,69,7D,60
    ,51,9A,5F,7C,51,C8,6B,C8,6B
D2  151 DATA C8,73,64,7F,71,02,09
    ,02,71,69,63,69,71,71,05,1E
C7  152 DATA 71,1D,1E,10,15,71,76
    ,1A,14,03,1F,76,71,77,71,76
2D  153 DATA 7A,1C,10,18,1F,76,71
    ,10,1F,15,51,A3,5F,7F,51,C8
5C  154 DATA 73,71,71,71,02,10,07
    ,14,71,17,18,1F,18,02,19,14
EE  155 DATA 15,71,76,1E,1F,14,71
    ,01,10,03,05,76,71,17,18,1D
E1  156 DATA 14,51,74,5E,7E,51,C9
    ,6B,C8,6B,C8,73,67,7F,71,12
CE  157 DATA 03,04,1F,12,19,71,71
    ,76,1E,1F,14,71,01,10,03,05
C9  158 DATA 76,71,71,05,1E,71,17
    ,04,03,05,19,14,03,71,03,14
4B  159 DATA 15,04,12,14,51,69,5E
    ,61,51,C8,73,71,71,71,15,18
EC  160 DATA 02,1A,71,02,01,10,12
    ,14,51,1A,5E,60,51,DA,93,79
DD  161 DATA 60,68,66,78,E3,67,65
    ,F6,65,68,51,07,5E,63,51,CF
15  162 DATA 67,64,60,63,67,51,0D
    ,5E,62,51,6B,51,D4,5E,65,51
74  163 DATA 6B,6B,6B,6B,6B,6B,6B
    ,6B,6B,6B,6B,6B,6B,6B,6B,6B
B8  164 DATA 6B,6B,6B,6B,6B,6B,6B
    ,6B,6B,6B,6B,6B,6B,6B,6B,6B
4E  165 DATA 6B,6B,6B,6B,51,FF,5E
    ,64,51,6B,6B,6B,6B,6B,6B,6B
F9  166 DATA 6B,6B,6B,6B,6B,6B,6B
    ,6B,6B,6B,6B,6B,6B,6B,6B,6B
B2  167 DATA 6B,6B,6B,6B,6B,6B,6B
    ,6B,6B,6B,6B,6B,6B,51,86,5E
B0  168 DATA 67,51,6B,6B,71,71,71
    ,71,71,71,71,71,71,71,71,71
9E  169 DATA 71,71,71,71,71,71,71
    ,71,71,71,71,71,71,71,71,71
7D  170 DATA 71,71,71,71,6B,6B,51
    ,51,41,66,51,6B,6B,71,71,05
D7  171 DATA 19,18,02,71,01,03,1E
    ,16,03,10,1C,71,06,10,02,71
89  172 DATA 06,03,19,05,05,14,1F
    ,71,13,08,6B,71,71,6B,6B,51
67  173 DATA 78,41,69,51,6B,6B,71
    ,71,71,71,71,71,71,71,71,71
81  174 DATA 71,71,71,71,71,71,71
    ,71,71,71,71,71,71,71,71,71
16  175 DATA 71,71,71,71,71,71,6B
    ,6B,51,00,41,68,51,6B,6B,71
1F  176 DATA 71,1D,14,02,71,10,1D
    ,1D,10,1F,71,71,63,69,71,10
46  177 DATA 05,1A,18,1F,02,C0,71
    ,15,03,18,07,14,71,71,6B,6B
BE  178 DATA 51,28,41,6B,51,6B,6B
```

```
      ,71,71,71,71,71,71,71,71,71
E4   179 DATA 71,71,71,71,71,71,71
      ,71,71,71,71,71,71,71,71,71
93   180 DATA 71,71,71,71,71,71,71
      ,6B,6B,51,F0,41,6A,51,6B,6B
67   181 DATA 71,71,1F,76,01,E1,05
      ,71,71,71,71,C0,71,05,19,14
93   182 DATA 71,16,10,03,15,14,1F
      ,71,18,02,1D,14,71,71,6B,8B
2C   183 DATA 51,9B,41,6D,51,6B,6B
      ,71,71,71,71,71,71,71,71,71
CF   184 DATA 71,71,71,71,71,71,71
      ,71,71,71,71,71,71,71,71,71
87   185 DATA 71,71,71,71,71,71,71
      ,6E,6D,51,A0,41,6C,51,6B,6B
2C   186 DATA 71,71,02,1E,71,DE,14
      ,1C,13,14,03,71,71,05,1E,71
3B   187 DATA 71,16,18,07,14,71,12
      ,03,14,15,18,05,71,71,6B,6B
E5   188 DATA 51,4E,40,6F,51,6B,6B
      ,71,71,71,71,71,71,71,71,71
F2   189 DATA 71,71,71,71,71,71,71
      ,71,71,71,71,71,71,71,71,71
6D   190 DATA 71,71,71,71,71,71,71
      ,6B,6B,51,12,40,6E,51,6B,6B
1B   191 DATA 71,71,05,19,14,03,14
      ,71,12,03,14,15,18,05,71,18
F5   192 DATA 02,71,15,04,14,70,70
      ,70,70,70,70,70,70,70,71,71
43   193 DATA 6B,6B,51,3D,40,11,51
      ,6B,6B,71,71,71,71,71,71,71
55   194 DATA 71,71,71,71,71,71,71
      ,71,71,71,71,71,71,71,71,71
12   195 DATA 71,71,71,71,71,71,71
      ,71,71,EB,6D,51,C4,40,10,51
5E   196 DATA 6E,6B,6E,6E,66,6E,66
      ,6E,6E,6E,6B,6D,6E,6B,6E,6D
5A   197 DATA 6B,65,6E,6D,6B,6B,6B
      ,6E,6D,6E,6E,6B,6E,6B,6B,6D
E0   198 DATA 6B,6E,6E,6B,51,EF,40
      ,13,51,6E,6B,6E,6E,6E,6E,6E
98   199 DATA 65,6B,6E,6B,6B,6B,6B
      ,6B,6B,6B,6E,6E,6E,6B,6B,6E
CB   200 DATA 6B,6B,6B,6E,6B,6B,6B
      ,6B,6B,6B,6E,6B,6E,51,51,51
4A   201 DATA 08,51,08,51,08,BF,BF
      ,BF,BF,BF,BF,BF,BF,BF,BF,BF
5D   202 DATA BF,BF,BF,BF,BF,BF,BF
      ,BF,BF,BF,BF,BF,BF,BF,BF,BF
5C   203 DATA BF,BF,BF,BF,BF,BF,BF
      ,BF,BF,BF,BF,BF,BF,BF,BF,BF
23   204 DATA BF,BF,BF,BF,BF,BF,BF
      ,BF,BF,BF,BF,BF,BF,BF,BF,BF
38   205 DATA A9,1C,8D,10,08,A9,08
      ,8D,11,08,A9,00,85,FB,A9,08
3B   206 DATA 85,FC,A0,12,B1,FB,49
      ,51,91,FB,C8,D0,F7,E6,FC,A5
CD   207 DATA FC,C9,12,D0,EF,60,EE
      ,EE,EE,EE,EE,EE,EE,EE,EE,EE
ED   208 DATA A9,00,A8,85,FB,85,FD
      ,A9,80,85,FC,A9,08,85,FE,B1
1F   209 DATA FB,91,FD,C8,D0,F9,E6
      ,FC,E6,FE,A5,FC,C9,A0,D0,EF
A0   210 DATA A2,00,BD,63,8A,9D,3C
      ,03,E8,E0,C4,D0,F5,A9,08,AA
D5   211 DATA A8,20,BA,FF,A9,0E,A2
      ,9B,A0,8A,20,BD,FF,A9,01,85
08   212 DATA 2B,A9,08,85,2C,A9,2B
      ,A2,26,A0,12,20,D8,FF,A9,04
A2   213 DATA A2,AB,A0,8A,20,BD,FF
      ,A9,3C,85,2B,A9,03,85,2C,A9
E8   214 DATA 2B,A2,00,A0,04,20,D8
      ,FF,4C,6E,FE,4F,4E,45,20,50
03   215 DATA 41,52,54,20,4D,41,4B
      ,45,52,EE,EE,4D,45,4D,33,EE
08   216 DATA A0,04,20,A9,00,A8,85
      ,FB,A2,08,BE,FC,91,FB,C8,D0
F4   217 DATA FB,E6,FC,A6,FC,E0,D0
      ,D0,F3,A9,08,AA,A0,02,20,BA
2B   218 DATA FF,A9,04,A2,FC,A0,03
      ,20,BD,FF,A9,00,AA,A0,A0,20
48   219 DATA D5,FF,A9,08,AA,A9,20
      ,BA,FF,A9,05,A2,F7,A0,03,20
3B   220 DATA BD,FF,A9,00,20,D5,FF
      ,A2,00,BD,C1,03,9D,D0,CF,E8
78   221 DATA E0,30,D0,F5,A9,4C,8D
      ,0D,08,A9,D0,8D,0E,08,A9,CF
0A   222 DATA 8D,0F,29,A9,36,85,01
      ,A9,08,A2,EF,A0,03,20,BD,FF
44   223 DATA A9,01,85,2B,A9,08,85
      ,2C,A9,2B,A2,00,A0,D0,20,D8
97   224 DATA FF,A9,37,85,01,4C,0D
      ,08,78,A9,34,85,01,A0,00,84
4F   225 DATA FB,84,FD,A9,A0,85,FC
      ,A9,D0,85,FE,B1,FB,91,FD,C8
BE   226 DATA D0,F9,E6,FC,E6,FE,D0
      ,F3,A9,37,85,01,58,20,44,E5
B2   227 DATA 4C,10,08,00,00,00,4F
      ,4E,45,20,50,41,52,54,2E,4D
5F   228 DATA 41,49,4E,4B,45,52,4E
      ,EE,EE,EE,EE,EE,EE,EE,EE,EE
DF   229 :
DC   230 :
67   231 ::::::::::::::::::::::::::::
      ::::::::::::
78   232 :   ONE PART MAKER  BY LE
      S ALLAN   :
FC   233 :   29 ATKINSON DRIVE NEW
      PORT IW   :
6A   234 ::::::::::::::::::::::::::::
      ::::::::::::
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Nursery Rhyme Land

Adventure games are a useful asset to education via a computer. Here we bring you the graphics for our own educational game.

By Margaret and Allen Webb

There's nothing that enhances an adventure game so much as some eye-catching graphics, providing that available memory allows for this indulgence.

Our Nursery Rhyme Land game is aimed at the very young and so the graphics have additional importance in keeping the interest going and also aiding recognition of locations.

In the February issue of *Your Commodore*, we brought you the loaders for the text part of this game. This month – in the final part – we are providing the graphics driver.

Getting in the picture

The method of creating a binary file is as follows:

1. Turn on or cold reset your 64.
2. Enter this line in direct mode:

POKE 44,80: POKE 80*256,0: NEW

3. Load and run Listings 3, 4 and 5 (in that order).
4. Load and Run Listing 2. Save the block starting at 8192 and finishing at 17176. Listing 1 (*YC Feb 87*) assumes that the file is called PICTURE BLOCK.
5. If you have already tried the textual part of the adventure on its own, don't forget to reset line 40 of the adventure booter to that given in Listing 1 (*YC Feb 87*).

YC

```
PROGRAM: LOADER.3

AE  1 REM ***********************
33  2 REM * NURSERY RHYME LAND *
A9  3 REM *      LOADER 3      *
AB  4 REM ***********************
10  2000 FORL=0TO175:CX=0:FORD=0T
    O15:READA:CX=CX+A:POKE8192+L*
    16+D,A:NEXTD
B2  2010 READA:IFA<>CXTHENPRINT"E
    RROR IN LINE";2040+(L*10):STO
    P
0F  2020 NEXTL:END
1E  2040 DATA85,85,84,85,85,64,10
    1,85,64,89,101,128,86,150,80,
    89,1461
7E  2050 DATA169,64,86,149,64,82,
    149,0,30,48,64,10,0,0,10,0,92
    5
2D  2060 DATA0,40,0,0,40,0,0,40,0
    ,0,40,0,0,106,85,80,431
97  2070 DATA136,128,5,64,16,0,16
    ,0,0,5,80,84,80,0,0,255,869
9A  2080 DATA0,0,192,0,0,15,0,0,6
    3,0,15,63,0,0,63,0,411
38  2090 DATA0,15,0,0,192,0,0,3,0
    ,0,3,0,0,0,0,0,213
B1  2100 DATA0,0,0,0,0,0,0,42,1
    70,0,136,32,2,89,101,572
C9  2110 DATA81,8,100,5,54,0,0,4,
    20,80,16,0,4,1,67,191,641
38  2120 DATA0,0,0,15,0,0,63,19
    2,0,255,252,0,63,0,0,840
AE  2130 DATA0,0,0,64,0,37,64,1
    49,86,84,85,149,152,89,101,10
    60
91  2140 DATA160,101,85,128,85,10
    6,0,85,170,0,105,168,8,170,16
    0,0,1532
9D  2150 DATA170,128,0,170,32,128
    ,170,0,0,168,10,0,160,0,0,255
    ,1391
63  2160 DATA0,0,0,0,0,0,0,0,0,
    0,3,0,0,15,0,18
60  2170 DATA0,0,1,0,0,21,84,0,38
    ,101,90,37,85,85,10,101,653
EC  2190 DATA149,2,150,86,0,170,8
    5,0,170,89,0,42,165,8,10,170.
    1296
C1  2190 DATA0,2,170,0,0,170,32,1
    60,170,0,0,42,10,0,170,183,11
    09
53  2200 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
FE  2210 DATA0,0,0,0,64,0,37,64,1
    49,86,84,85,149,152,89,101,10
    60
01  2220 DATA160,101,86,128,85,10
    6,0,85,170,0,105,168,8,170,16
    0,0,1532
8D  2230 DATA170,128,0,170,32,128
    ,170,0,0,168,10,0,160,0,0,255
    ,1391
5D  2240 DATA0,0,0,0,0,0,0,0,15,0
    ,0,63,0,0,255,0,333
32  2250 DATA0,12,1,0,0,21,84,0,3
    8,101,90,37,85,85,10,101,655
1C  2260 DATA149,2,150,86,0,170,8
    5,0,170,89,0,42,165,8,10,170,
    1296
0D  2270 DATA0,2,170,0,0,170,32,1
    60,170,0,0,42,10,0,170,191,11
    17
8F  2280 DATA0,0,0,0,3,0,0,15,192
    ,0,63,252,0,15,0,0,540
8E  2290 DATA0,0,0,0,64,0,37,64,1
    49,86,84,85,149,152,89,101,10
    60
31  2300 DATA150,101,86,128,85,10
    6,0,85,170,0,105,168,8,170,16
    0,0,1532
F2  2310 DATA170,128,0,170,32,128
    ,170,0,0,168,10,0,160,0,0,255
    ,1391
CA  2320 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
93  2330 DATA0,0,1,0,0,21,84,0,38
    ,101,90,37,85,85,10,101,653
8F  2340 DATA149,2,170,150,0,37,8
    5,0,10,89,0,2,149,8,0,154,100
    5
65  2350 DATA0,2,170,0,0,170,32,1
    60,170,0,0,42,10,0,170,151,10
    77
F2  2360 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
08  2370 DATA0,0,0,0,62,0,3,250,0
    ,15,250,0,63,254,3,255,1155
```

```
66 2380 DATA255,15,255,255,15,255,250,63,255,234,255,255,234,255,255,250,3356
37 2390 DATA255,255,254,255,255,255,255,255,250,255,255,234,255,255,170,255,3968
1A 2400 DATA0,0,0,0,0,0,0,0,0,0,0,0;0,0,0,0,0
3A 2410 DATA0,0,252,0,0,255,0,0,255,192,0,191,252,0,175,255,1827
86 2420 DATA0,171,255,240,175,255,252,255,255,255,191,255,255,175,255,255,3499
A1 2430 DATA171,255,255,170,255,255,170,255,255,171,255,255,175,255,255,191,3598
42 2440 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
48 2450 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
E0 2460 DATA0,0,0,62,0,3,250,0,15,250,0,63,254,3,255,255,1410
40 2470 DATA15,255,255,15,255,250,63,255,234,255,255,234,255,255,250,255,3356
6A 2480 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
70 2490 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
68 2500 DATA0,252,0,0,255,0,0,255,192,0,191,252,0,175,255,0,1827
74 2510 DATA171,255,240,175,255,252,255,255,255,191,255,255,175,255,255,183,3682
92 2520 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
98 2530 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
5D 2540 DATA0,0,0,0,0,0,0,0,0,0,0,0,62,0,3,250,315
64 2550 DATA0,15,250,0,63,254,3,255,255,15,255,255,15,255,250,255,2395
69 2560 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
C7 2570 DATA0,0,0,0,0,0,0,0,0,0,0,0,0;0,0,0,0
8C 2580 DATA0,0,0,0,0,0,0,0,0,0,252,0,0,255,0,0,507
3C 2590 DATA255,192,0,191,252,0,175,255,0,171,255,240,175,255,252,191,2859
65 2600 DATA0,0,0,0,0,0,0,0,0,243,195,0,255,243,192,247,1375
4D 2610 DATA221,240,221,221,120,170,122,224,102,169,84,85,85,80,85,85,2314
A3 2620 DATA64,0,0,0,0,0,0,240,0,0,253,80,0,245,64,0,946
5D 2630 DATA229,0,0,148,0,0,80,0,0,64,0,0,0,0,0,255,776
80 2640 DATA0,0,0,0,0,0,0,12,0,0,63,3,3,255,207,15,558
D5 2650 DATA119,223,45,119,119,11,173,170,21,106,153,5,85,85,1,85,1520
F9 2660 DATA85,0,0,0,0,0,0,0,0,15,0,5,127,0,1,127,360
4A 2570 DATA0,0,107,0,0;26,0,0,5,0,0,1,0,0,0,183,322
AB 2590 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,16,16
69 2690 DATA0,0,21,80,84,86,149,85,86,65,148,153,84,96,165,85,1397
88 2700 DATA32,149,101,111,153,150,124,150,89,240,149,165,192,165,175,192,2337
04 2710 DATA166,191,192,186,191,0,254,188,0,250,252,0,250,240,0,255,2615
59 2720 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
06 2730 DATA0,0,0,0,0,0,84,0,1,85,64,5,85,85,22,89,520
06 2740 DATA89,7,150,101,13,102,150,3,90,90,3,218,250,0,250,250,1766
01 2750 DATA0,242,190,0,62,187,0,250,191,0,250,255,3,234,255,191,2310
81 2760 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
63 2770 DATA0,0,0,0,0,0,21,0,1,85,64,85,85,80,101,101,623
66 2780 DATA148,89,150,208,150,153,112,165,165,192,175,167,192,175,175,0,2416
AD 2790 DATA190,143,0,238,188,0,254,175,0,255,175,0,255,171,192,255,2491
A9 2800 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
4B 2810 DATA0,4,21,5,84,85,86,149,22,65,149,9,21,102,8,85,895
99 2820 DATA90,249,89,86,61,150,102,15,101,150,3,90,86,3,250,90,1615
63 2830 DATA3,254,154,0,254,174,0,62,191,0,63,175,0,15,175,179,1699
1A 2840 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,81,81
B5 2850 DATA17,0,85,85,64,85,85,124,89,85,80,86,86,92,150,105,1318
CD 2860 DATA223,103,149,252,102,87,240,90,87,255,218,223,252,250,253,240,3024
9A 2870 DATA235,245,64,235,214,112,235,214,124,238,251,252,191,191,255,255,3311
63 2880 DATA0,0,0,0,0,0,1,80,0,85,85,64,85,85,80,101,666
EA 2890 DATA86,84,88,9,84,214,229,85,246,149,87,86,149,103,101,165,1965
9C 2900 DATA158,26,165,151,21,110,95,13,105,127,3,235,245,15,235,213,1917
BD 2910 DATA63,235,89,255,235,214,63,190,245,15,191,189,2,255,239,191,2671
9D 2920 DATA0,0,0,0,0,0,0,5,64,1,85,85,5,85,85,21,436
29 2930 DATA149,89,21,96,37,85,91,151,213,86,159,217,86,149,182,90,1901
33 2940 DATA89,214,90,164,245,185,84,253,105,112,95,235,192,87,235,240,2625
DD 2950 DATA101,235,252,151,235,255,95,190,252,126,254,240,251,255,128,255,3275
48 2960 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
E9 2970 DATA68,69,1,85,85,61,85,85,5,85,101,53,149,149,247,105,1433
E8 2980 DATA150,63,86,217,15,213,153,255,213,165,63,247,167,15,127,175,2324
C2 2990 DATA1,95,235,13,151,235,61,151,235,63,239,187,255,254,254,183,2612
78 3000 DATA85,85,85,85,85,85,149,85,149,106,86,85,86,85,86,85,1513
CE 3010 DATA153,86,101,161,106,151,234,250,85,235,250,91,175,235,91,175,2579
4A 3020 DATA251,102,191,255,150,176,63,191,192,0,175,0,0,239,0,0,1985
8A 3030 DATA240,0,0,240,0,0,192,0,0,192,0,0,192.0,0.255,1311
72 3040 DATA85,85,85,85,86,86,90,89,89,165,165,101,149,165,85,85.1695
1B 3050 DATA105,86,17,41,85,239,250,89,235,251,150,251,239,101,255,253,2647
2B 3060 DATA89,255,255,86,255,255,254,3,243,254,0,3,254,0,0,250,2456
96 3070 DATA0,0,250,0,0,46,0,0,15,0,0,63,0,0,15,255,644
A6 3080 DATA0,0,0,0,0,0,0,5,64,1,85,85,5,85,85,21,436
98 3090 DATA149,89,21,96,37,85,91,151,213,86,159,217,86,149,182,90,1901
9C 3100 DATA89,214,90,164,245,185,84,253,105,112,95,235,192,87,235,240,2625
D0 3110 DATA101,235,252,151,235,255,95,190,252,126,254,240,251,255,128,255,3275
EF 3120 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
B0 3130 DATA68,69,1,85,85,61,85,85,5,85,101,53,149,149,247,105,1433
07 3140 DATA150,63,86,217,15,213,153,255,213,165,63,247,167,15,127,175,2324
CF 3150 DATA1,95,235,13,151,235,61,151,235,63,239,187,255,254,254,183,2612
67 3160 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,81,81
36 3170 DATA17,0,85,85,64,85,85,124,89,85,80,86,86,92,150,105,1318
B8 3180 DATA223,103,149,252,102,87,240,90,87,255,218,223,252,250,253,240,3024
C9 3190 DATA235,245,64,235,214,112,235,214,124,238,251,252,191,191,255,255,3311
0E 3200 DATA0,0,0,0,0,0,0,5,64,1,85,85,5,85,85,21,436
F0 3210 DATA149,89,21,96,37,85,91,151,213,86,159,217,86,149,182,90,1901
94 3220 DATA89,214,90,164,245,185,84,253,105,112,95,235,192,87,235,240,2625
D1 3230 DATA101,235,252,151,235,255,95,190,252,126,254,240,251,255,128,191,3211
CC 3240 DATA0,0,0,0,15,0,0,63,192,0,255,252,0,63,0,0,840
FA 3250 DATA0,0,0,0,64,0,37,64,149,86,84,85,149,152,89,101,1060
0D 3260 DATA160,101,86,128,85,106,0,85,170,0,105,168,8,170,160,0,0,1532
F1 3270 DATA170,128,0,170,32,128,170,0,0,168,10,0,160,0,0,255,1391
3A 3280 DATA0,0,0,0,0,0,0,0,0,0,0,50,0,0,58,0,108
CD 3290 DATA0,42,0,0,170,20,84,63,21,85,127,21,85,123,5,85,931
8A 3300 DATA123,1,85,123,0,85,65,0,85,5,0,20,21,8,0,85,706
90 3310 DATA0,1,85,0,1,85,32,160,85,0,0,85,10,0,21,182,747
8C 3320 DATA0,0,234,0,2,234,0,2,170,0,10,170,0,10,170,0,1002
A5 3330 DATA10,250,0,11,254,0,3,175,0,3,175,0,3,174,170,171,1399
E2 3340 DATA254,130,11,254,130,11,254,130,11,254,0,0,1,0,0,1,1441
AA 3350 DATA0,0,5,0,0,5,0,0,21,0,0,21,0,0,21,255,328
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CD  3360 DATA168,0,3,170,0,15,170
    ,128,15,170,160,63,170,160,15
    ,175,1582
C5  3370 DATA160,0,191,224,0,250,
    192,0,250,192,0,186,192,0,191
    ,224,2252
08  3380 DATA0,191,232,0,191,226,
    0,191,224,128,64,0,160,64,0,1
    36,1807
D4  3390 DATA80,0,130,80,0,2,84,0
    ,2,84,0,2,84,0,0,191,739
44  3400 DATA127,255,240,127,255,
    240,127,255,240,85,85,66,85,8
    5,86,85,2443
5C  3410 DATA85,66,85,85,90,85,85
    ,25,85,85,90,85,84,74,85,85,1
    280
47  3420 DATA90,85,81,26,85,85,10
    6,85,84,106,85,85,106,85,81,1
    06,1381
1F  3430 DATA85,81,42,85,85,170,8
    5,84,170,85,68,170,85,69,170,
    255,1789
4D  3440 DATA15,221,255,13,83,127
    ,4,115,71,148,85,20,149,69,85
    ,149,1609
02  3450 DATA85,85,161,85,85,161,
    21,85,165,85,85,164,85,85,165
    ,85,1687
EF  3460 DATA85,165,21,85,169,85,
    85,168,69,85,169,85,85,169,21
    ,85,1631
DE  3470 DATA169,81,85,170,17,85,
    170,5,85,170,68,85,170,84,85,
    179,1708
F0  3480 DATA0,0,0,160,0,0,170,12
    8,0,170,170,0,170,170,0,170,1
    308
2A  3490 DATA170,0,170,170,0,170,
    234,3,171,234,3,171,234,3,171
    ,234,2138
2B  3500 DATA3,171,234,3,168,234,
    3,171,233,85,171,229,85,171,2
    13,85,2259
2F  3510 DATA171,85,85,169,85,85,
    165,85,85,149,85,85,85,85,85,
    255,1844
93  3520 DATA0,0,0,0,0,10,0,2,170
    ,0,170,170,0,170,170,0,862
4A  3530 DATA170,170,0,170,170,19
    2,171,170,192,171,234,192,171
    ,234,192,171,2770
FE  3540 DATA234,192,171,234,192,
    171,42,85,107,234,85,91,234,8
    5,87,234,2478
FE  3550 DATA85,85,234,85,85,106,
    85,85,90,85,85,86,85,85,85,19
    1,1642
C0  3560 DATA0,0,0,160,0,0,170,12
    8,0,170,170,0,170,170,0,170,1
    308
9B  3570 DATA170,0,170,170,15,170
    ,170,13,170,170,15,170,170,13
    ,170,42,1798
F6  3580 DATA15,168,42,0,162,42,0
    ,139,41,85,138,255,255,139,25
    5,255,1990
C0  3590 DATA143,255,252,191,255,
    244,191,255,213,133,85,21,69,
    85,21,255,2668
BB  3600 DATA0,0,0,0,0,10,0,2,170
    ,0,170,170,0,170,170,0,862
F5  3610 DATA170,170,252,170,170,
    220,171,170,252,171,234,220,1
    71,234,252,171,3198
4F  3620 DATA234,0,171,234,0,171,
    42,85,107,234,85,91,234,85,87
    ,234,2094
03  3630 DATA85,85,234,85,85,106,
    85,85,90,85,85,86,85,85,85,18
    3,1634
11  3640 DATA0,0,0,160,0,0,170,12
    8,0,170,170,0,170,170,0,170,1
    308
FB  3650 DATA170,0,170,170,0,170,
    234,0,171,234,0,171,234,0,171
    ,234,2129
EF  3660 DATA0,171,234,0,168,234,
    0,171,233,85,171,229,85,171,2
    13,85,2250
6B  3670 DATA171,85,85,169,85,85,
    165,85,85,149,85,85,85,85,85,
    255,1844
8B  3680 DATA0,0,0,0,0,10,0,2,170
    ,0,170,170,0,170,170,0,862
AB  3690 DATA170,170,0,170,170,0,
    170,170,0,170,170,0,170,170,0
    ,170,1870
37  3700 DATA170,0,170,170,0,170,
    170,85,106,170,85,90,170,85,8
    6,170,1897
F4  3710 DATA85,85,170,85,85,106,
    85,85,90,85,85,86,85,85,85,19
    1,1578
61  3720 DATA0,0,0,160,0,0,170,12
    8,0,170,170,0,170,170,0,170,1
    308
6B  3730 DATA170,0,170,170,0,170,
    234,0,171,234,0,171,234,0,171
    ,234,2129
9F  3740 DATA0,171,234,0,168,234,
    0,171,233,85,171,229,85,171,2
    13,85,2250
DB  3750 DATA171,85,85,169,85,85,
    165,85,85,149,85,85,85,85,85,
    255,1844
9B  3760 DATA0,0,0,0,0,10,0,2,170
    ,0,170,170,0,170,170,0,862
0A  3770 DATA170,170,0,170,170,0,
    170,170,0,170,170,0,170,170,8
    5,90,1875
89  3780 DATA170,213,85,170,197,8
    5,170,221,85,106,215,218,234,
    85,214,234,2703
18  3790 DATA85,213,234,85,213,23
    4,85,85,90,85,85,86,85,85,85,
    183,2018
95  3800 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0
```

PROGRAM: LISTING 2

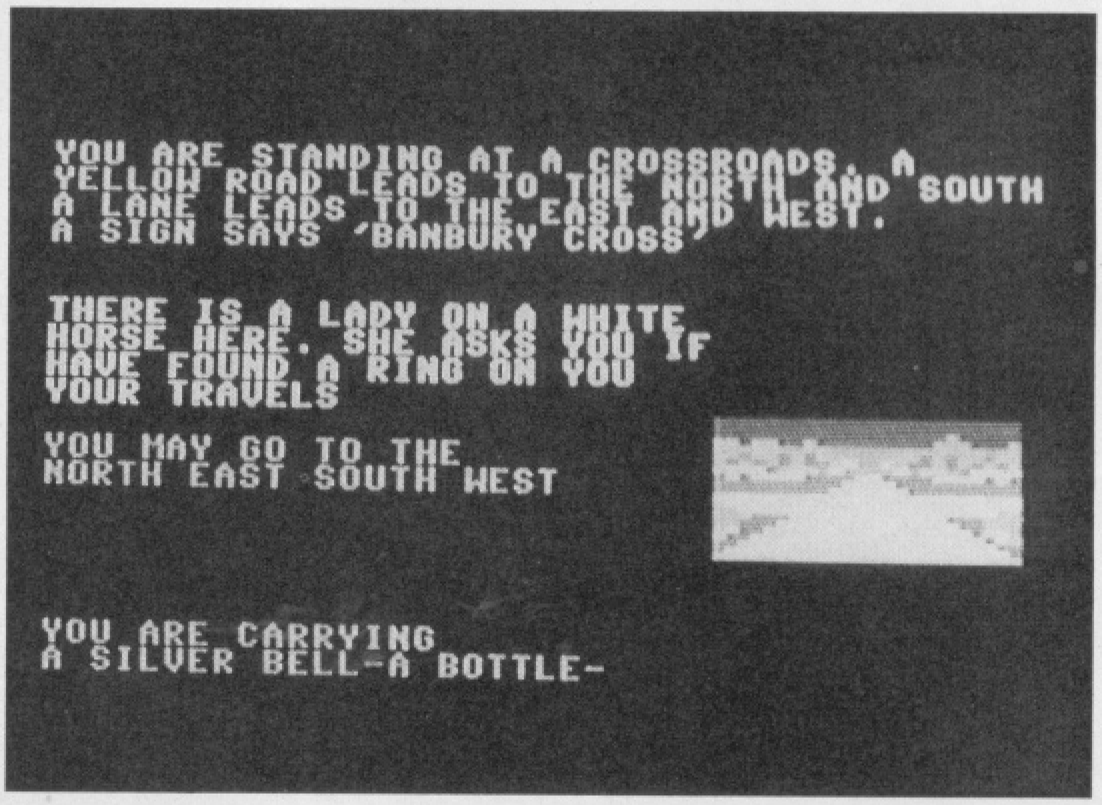
```
1 REM***********************
2 REM*      LISTING 2       *"
3 REM* BINARY FILE SAVER *"
4 REM***********************
10 INPUT"[CLR]START ADDRESS";SA
20 INPUT "END ADDRESS";FA
30 INPUT "DEVICE";DE
40 INPUT "FILE NAME";FI$
50 POKE194,SA/256:POKE193,SA-PEEK(194)*256
60 POKE175,FA/256:POKE174,FA-PEEK(175)*256
70 L=LEN(FI$)
80 FORI=1TOL:POKE1023+I,ASC(MID$(FI$,I,1))
:NEXT
90 POKE 187,0:POKE188,4:POKE183,L:POKE186,
DE:SYS62954
```

PROGRAM: LOADER.4

```
AE  1 REM ***********************
33  2 REM * NURSERY RHYME LAND *
A9  3 REM *      LOADER 4       *
AE  4 REM ***********************
A2  2000 FORL=0TO176:CX=0:FORD=0T
    O15:READA:CX=CX+A:POKE11008+L
    *16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"E
    RROR IN LINE";2040+(L*10):STO
    P
0F  2020 NEXTL:END
75  2040 DATA0,0,0,0,0,0,0,0,0,65
    ,4,16,65,4,16,85,255
44  2050 DATA85,85,65,4,16,65,4,1
    6,161,40,24,159,170,42,170,17
    0,1285
7B  2060 DATA170,34,158,170,170,4
    2,162,174,43,232,255,175,250,
    255,255,255,2810
E8  2070 DATA255,255,254,255,255,
    255,255,255,255,255,255,255,2
    55,255,255,255,4079
1C  2080 DATA0,0,0,0,0,0,0,0,0,65
    ,4,16,65,4,16,85,255
85  2090 DATA85,85,65,4,16,65,4,1
    6,129,36,26,161,170,42,170,17
    0,1244
CD  2100 DATA170,42,170,162,40,13
    8,40,162,138,162,175,171,235,
    191,234,255,2405
2D  2110 DATA255,255,255,255,255,
    255,255,255,255,255,255,255,2
    55,255,255,191,4016
38  2120 DATA0,0,0,0,15,0,0,63,19
    2,0,255,252,0,63,0,0,840
AE  2130 DATA0,0,0,0,64,0,37,54,1
    49,86,84,85,149,152,89,101,10
    60
```

```
91  2140 DATA160,101,86,128,95,106,0,85,170,0,105,168,8,170,160,0,1532
9D  2150 DATA170,129,0,170,32,129,170,0,0,168,10,0,160,0,0,255,1391
B3  2160 DATA0,0,0,0,0,0,0,0,0,0,15,0,0,63,0,78
9F  2170 DATA0,3,1,0,0,1,88,0,21,149,85,38,85,85,10,89,657
7D  2180 DATA101,10,149,89,2,169,85,2,170,85,0,170,105,160,42,170,1509
BD  2190 DATA0,2,170,2,8,170,0,0,170,0,160,170,0,0,10,247,1109
53  2200 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
8F  2210 DATA0,0,0,0,0,0,0,0,0,0,0,255,0,15,255,525
3A  2220 DATA240,255,119,254,255,253,254,223,255,250,127,254,170,255,234,170,3568
6D  2230 DATA255,170,170,255,170,170,127,234,170,223,250,170,255,254,170,255,3298
7B  2240 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
05  2250 DATA0,0,0,0,0,0,0,0,0,63,240,3,223,252,63,127,971
A3  2260 DATA255,253,255,255,175,255,223,170,255,255,171,245,255,175,255,255,3707
E7  2270 DATA175,255,255,191,127,255,175,215,255,170,253,255,170,175,255,191,3372
A3  2280 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
43  2290 DATA0,0,0,0,0,0,0,0,15,252,0,63,247,192,255,253,1277
5A  2300 DATA252,255,255,127,247,255,250,255,255,170,255,95,234,255,255,250,3665
E0  2310 DATA255,255,250,255,253,254,255,215,250,255,127,170,255,250,170,255,3724
CA  2320 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
F4  2330 DATA0,0,0,0,0,0,0,0,0,0,0,255,0,15,255,525
F2  2340 DATA240,191,221,255,191,127,255,175,255,247,170,191,253,170,171,255,3367
1E  2350 DATA170,170,255,170,170,255,170,171,253,170,175,247,170,191,255,183,3175
F2  2360 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
BC  2370 DATA0,0,0,0,0,0,0,0,0,0,0,255,0,15,255,525
15  2380 DATA240,255,119,254,255,253,254,223,255,250,127,254,170,255,234,170,3558
74  2390 DATA255,170,170,255,170,170,127,234,170,223,250,170,255,254,170,255,3298
1A  2400 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
B0  2410 DATA0,0,0,0,0,0,0,0,0,63,240,3,223,252,63,127,971
06  2420 DATA255,253,255,255,175,255,223,170,255,255,171,245,255,175,255,255,3707
82  2430 DATA175,255,255,191,127,255,175,215,255,170,253,255,170,175,255,191,3372
15  2440 DATA0,0,0,0,0,21,64,5,85,86,82,165,153,86,90,837
8C  2450 DATA89,166,22,101,105,22,149,90,10,20,26,10,0,10,40,0,860
FA  2460 DATA50,40,0,242,40,3,200,40,3,192,160,15,192,32,63,0,1272
E8  2470 DATA8,63,0,0,15,192,0,63,240,0,255,192,3,255,240,255,1781
EF  2480 DATA0,0,0,85,85,64,85,85,85,105,85,149,89,86,85,86,1174
27  2490 DATA86,106,86,89,149,149,149,149,133,166,81,129,166,64,128,170,2000
E0  2500 DATA2,128,40,2,32,40,2,32,40,2,0,42,2,0,42,8,414
A4  2510 DATA0,170,8,0,138,0,2,0,128,0,0,32,0,0,0,181,659
27  2520 DATA0,0,0,85,85,64,85,85,85,105,85,149,89,86,85,86,1174
0F  2530 DATA86,106,86,89,149,149,149,149,133,166,81,129,166,64,128,170,2000
88  2540 DATA2,128,40,2,32,40,2,32,40,2,0,42,2,0,42,8,414
9D  2550 DATA0,170,8,0,138,0,2,0,128,0,0,32,0,0,0,255,733
38  2560 DATA0,0,0,0,0,80,1,84,133,149,85,149,102,90,154,1027
D8  2570 DATA101,165,105,89,148,165,86,148,164,20,160,160,0,160,191,192,2054
76  2580 DATA40,143,192,40,47,240,40,3,240,40,15,240,10,15,252,8,1565
D3  2590 DATA3,252,32,3,255,0,15,255,0,15,255,192,63,255,240,191,2026
E1  2600 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
35  2610 DATA0,0,0,0,0,0,0,0,15,252,0,63,247,192,255,253,1277
B0  2620 DATA252,255,255,127,247,255,250,255,255,170,255,95,234,255,255,250,3665
B7  2630 DATA255,255,250,255,253,254,255,215,250,255,127,170,255,250,170,255,3724
09  2640 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
E9  2650 DATA0,0,0,0,0,0,0,0,0,0,0,255,0,15,255,525
21  2660 DATA240,191,221,255,191,127,255,175,255,247,170,191,253,170,171,255,3367
D9  2670 DATA170,170,255,170,170,255,170,171,253,170,175,247,170,191,255,183,3175
D6  2680 DATA0,0,0,0,0,21,64,5,85,86,82,165,153,86,90,837
E7  2690 DATA89,166,22,101,105,22,149,90,10,20,26,10,0,10,40,0,860
3A  2700 DATA51,40,0,255,40,3,206,40,3,206,160,15,207,32,63,15,1336
DB  2710 DATA8,63,15,0,15,192,0,63,240,0,255,192,3,255,240,255,1796
8C  2720 DATA0,0,0,85,64,4,101,149,21,101,175,255,149,111,255,148,1618
9B  2730 DATA15,255,80,14,255,0,15,255,0,14,255,239,15,255,239,206,2112
C4  2740 DATA255,187,255,255,251,255,215,251,255,215,187,255,215,251,255,215,3772
7E  2750 DATA239,255,215,239,192,215,0,0,0,0,0,0,0,0,0,191,1546
40  2760 DATA0,0,0,0,0,80,1,84,133,149,85,149,102,90,154,1027
D0  2770 DATA101,165,105,89,148,165,86,148,164,20,160,160,0,160,191,192,2054
CE  2780 DATA40,143,192,40,47,240,40,3,240,40,15,240,10,15,252,8,1565
17  2790 DATA3,252,32,3,255,0,15,255,0,15,255,192,63,255,240,255,2090
74  2800 DATA0,0,0,85,85,64,85,85,85,105,85,149,89,86,85,86,1174
6B  2810 DATA86,106,86,89,149,149,149,149,133,166,81,129,166,64,128,170,2000
B2  2820 DATA2,128,40,2,32,40,2,32,40,2,0,42,2,0,42,8,414
8F  2830 DATA0,170,8,0,138,0,2,0,128,0,0,32,0,0,0,179,657
D0  2840 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
9E  2850 DATA0,0,0,0,0,0,0,0,15,252,0,63,247,192,255,253,1277
21  2860 DATA252,255,255,127,247,255,250,255,255,170,255,95,234,255,255,250,3665
FE  2870 DATA255,255,250,255,253,254,255,215,250,255,127,170,255,250,170,255,3724
FB  2880 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
1E  2890 DATA0,0,0,0,0,0,0,0,0,0,0,255,0,15,255,525
50  2900 DATA240,191,221,255,191,127,255,175,255,247,170,191,253,170,171,255,3367
6E  2910 DATA170,170,255,170,170,255,170,171,253,170,175,247,170,191,255,191,3183
7E  2920 DATA0,0,0,0,0,0,0,0,0,3,0,0,15,240,0,63,321
09  2930 DATA252,0,15,192,0,0,0,0,0,0,0,0,0,0,21,85,565
24  2940 DATA64,85,89,80,85,86,85,85,85,85,85,105,85,90,85,85,1364
2D  2950 DATA85,149,85,85,101,85,85,89,85,85,85,85,85,85,85,255,1614
73  2960 DATA0,0,0,0,0,0,0,0,0,0,0,63,0,0,255,0,318
12  2970 DATA0,15,0,0,0,0,0,0,0,0,0,0,21,0,1,37
4F  2980 DATA85,0,5,85,0,21,85,85,85,89,85,85,101,85,85,149,1130
6F  2990 DATA85,85,85,85,89,85,101,165,89,85,85,101,85,85,85,183,1578
E3  3000 DATA0,0,0,0,0,0,0,0,0,0,6,0,0,86,0,92
E1  3010 DATA1,90,0,5,90,0,21,90,0,21,106,0,85,170,1,85,765
7B  3020 DATA170,5,85,170,5,85,170,21,85,106,85,85,90,85,85,90,1422
41  3030 DATA85,85,90,85,85,86,85,85,85,85,85,85,85,85,85,255,1536
CA  3040 DATA0,0,0,0,0,0,0,0,160,0,0,149,0,0,149,458
95  3050 DATA64,0,85,80,0,85,84,0,85,84,0,85,85,0,149,85,971
F7  3060 DATA64,165,85,80,165,85,80,169,85,84,170,85,85,170,85,85,1742
44  3070 DATA170,149,85,170,165,85,170,169,85,170,170,149,105,170,149,191,2353
C7  3080 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
19  3090 DATA0,0,0,0,0,0,0,0,0,0,3,0,0,3,0,0,6
CF  3100 DATA6,0,0,86,0,1,90,0,5,90,0,21,90,0,21,106,516
CF  3110 DATA0,85,170,1,85,170,5,85,170,5,85,170,21,85,106,255,1498
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EF  3120 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
C5  3130 DATA0,0,0,0,0,0,0,0,192,
    0,0,192,0,0,160,0,544
83  3140 DATA0,149,0,0,149,64,0,8
    5,80,0,85,84,0,85,84,0,865
A3  3150 DATA85,85,0,149,85,64,16
    5,85,80,165,85,80,169,85,84,1
    51,1617
17  3160 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
94  3170 DATA0,3,0,0,15,0,0,63,0,
    0,4,0,0,4,0,0,89
D8  3180 DATA4,0,0,15,0,0,15,0,0,
    15,0,0,15,0,0,6,70
86  3190 DATA0,0,86,0,1,90,0,5,90
    ,0,21,90,0,85,106,255,829
DF  3200 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,192,192
D4  3210 DATA0,0,240,0,0,252,0,0,
    16,0,0,16,0,0,16,0,540
D6  3220 DATA0,240,0,0,240,0,0,24
    0,0,0,240,0,0,165,0,0,1125
DE  3230 DATA165,64,0,149,80,0,14
    9,84,0,149,85,0,85,85,64,191,
    1350
37  3240 DATA0,0,0,0,0,0,0,0,0,24
    3,195,0,255,243,192,247,1375
D4  3250 DATA221,240,221,221,120,
    239,126,224,255,253,84,255,25
    3,80,255,85,3132
0B  3260 DATA64,255,84,4,221,80,0
    ,253,84,0,253,80,65,245,64,0,
    1752
4D  3270 DATA229,0,0,148,0,80,80,
    0,0,64,80,0,0,0,0,255,936
5E  3280 DATA0,0,0,0,0,0,0,12,0,0
    ,63,3,3,255,207,15,558
C8  3290 DATA119,223,45,119,119,1
    1,173,170,21,106,185,5,89,127
    ,1,86,1599
ED  3300 DATA223,0,86,255,0,22,19
    1,16,6,191,0,5,191,0,1,127,13
    14
74  3310 DATA0,0,107,5,0,26,0,0,5
    ,0,1,1,0,0,0,183,328
31  3320 DATA89,89,101,101,89,89,
    170,170,170,149,149,165,149,1
    49,149,165,2143
FE  3330 DATA149,149,170,170,170,
    86,153,89,86,89,89,86,89,101,
    170,170,2016
51  3340 DATA170,101,89,86,101,89
    ,86,105,86,89,170,170,170,85,
    85,85,1767
BA  3350 DATA0,0,0,60,60,0,0,252,
    0,0,63,12,0,0,0,255,702
A3  3360 DATA89,109,117,101,109,1
    21,170,175,250,150,94,118,86,
    94,118,86,1987
ED  3370 DATA158,118,170,175,250,
    101,94,117,101,93,117,149,93,
    117,170,175,2198
85  3380 DATA250,89,157,117,89,15
    7,117,101,173,121,170,175,250
    ,85,93,117,2261
8F  3390 DATA0,12,48,3,0,15,0,240
    ,48,15,0,12,0,0,0,191,584
U0  3400 DATA0,0,0,0,0,0,0,0,0,24
    3,195,0,255,243,192,247,1375
29  3410 DATA221,240,221,221,116,
    223,125,208,255,253,84,255,25
    3,80,255,90,3100
53  3420 DATA170,255,170,170,221,
    170,170,253,90,170,253,82,160
    ,245,64,0,2643
49  3430 DATA213,0,0,84,0,80,80,0
    ,0,64,80,0,0,0,0,255,856
2F  3440 DATA0,0,0,0,0,0,0,12,0,0
    ,63,3,3,255,207,15,558
C6  3450 DATA119,223,29,119,119,7
    ,93,85,21,85,117,5,85,127,170
    ,149,1553
68  3460 DATA223,170,169,255,170,
    169,127,170,165,255,168,5,127
    ,0,1,127,2301
DA  3470 DATA0,0,87,5,0,21,0,0,5,
    0,1,1,0,0,0,183,303
FD  3480 DATA0,0,0,0,0,0,0,4,0,0,
    68,1,0,85,17,0,175
81  3490 DATA85,221,116,87,213,95
    ,119,85,117,119,90,85,117,111
    ,87,93,1840
0C  3500 DATA127,87,93,96,213,221
    ,124,93,213,191,93,85,188,85,
    85,240,2234
53  3510 DATA85,90,192,85,87,240,
    101,103,252,122,127,192,127,2
    55,0,255,2313
5F  3520 DATA0,0,0,0,0,0,4,65,17,
    4,85,81,7,117,93,5,478
68  3530 DATA119,93,5,215,85,201,
    85,87,253,93,87,254,93,85,3,2
    13,1971
6D  3540 DATA213,15,149,117,3,185
    ,117,0,123,119,3,119,87,15.21
    3,87,1565
E0  3550 DATA3,230,85,0,53,101,0,
    5,101,0,247,93,3,250,223,191,
    1585
EA  3560 DATA0,0,0,0,0,0,68,65,16
    ,69,85,16,117,93,208,117,854
E6  3570 DATA221,80,85,215,80,213
    ,85,99,213,117,127,85,117,191
    ,87,87,2102
74  3580 DATA192,93,86,240,93,110
    ,192,221,237,0,213,221,192,21
    3,87,240,2630
BE  3590 DATA85,155,192,89,92,0,8
    9,80,0,117,223,0,247,175,192,
    255,1991
DA  3600 DATA0,0,0,0,0,0,0,16,0,6
    4,17,0,68,85,0,119,369
14  3610 DATA85,0,87,213,29,85,22
    1,245,165,221,93,249,93,85,25
    3,117,2241
55  3620 DATA213,9,117,213,61,119
    ,87,254,87,117,62,85,117,15,8
    5,85,1726
C7  3630 DATA3,165,85,15,213,85,6
    3,217,89,3,253,173,0,255,253,
    179,2051
84  3640 DATA170,154,106,170,154,
    106,166,154,166,166,154,166,1
    66,154,166,166,2484
CD  3650 DATA154,170,102,169,170,
    105,169,170,105,169,170,105,1
    69,171,105,169,2372
A0  3660 DATA171,169,169,175,170,
    106,111,170,106,175,170,128,1
    75,8,0,5,2008
36  3670 DATA0,0,21,0,0,85,0,1,84
    ,0,0,85,0,0,21,255,552
6F  3680 DATA154,170,170,154,154,
    105,153,154,105,153,170,105,1
    54,166,105,154,2326
4F  3690 DATA102,154,166,102,170,
    166,102,154,166,102,154,230,1
    02,154,234,102,2360
E3  3700 DATA154,234,102,166,250,
    102,166,250,166,166,250,169,1
    65,80,2,170,2593
57  3710 DATA64,0,168,0,0,0,0,0,0
    ,64,0,0,80,0,0,191,567
CF  3720 DATA255,255,255,234,170,
    255,150,149,191,89,85,111,169
    ,89,110,85,2652
4E  3730 DATA86,158,85,150,109,10
    2,150,89,86,37,81,218,38,64,2
    16,41,1710
AA  3740 DATA64,216,9,64,232,9,72
    ,232,9,34,232,137,136,202,42,
    34,1724
CA  3750 DATA200,136,136,34,34,34
    ,136,136,136,34,34,34,136,136
    ,136,255,1747
57  3760 DATA255,255,255,253,127,
    255,182,106,255,89,85,191,149
    ,1,174,148,2780
85  3770 DATA1,109,148,0,93,148,0
    ,93,144,1,93,144,1,85,84,1,11
    45
05  3780 DATA101,100,1,101,100,1,
    86,80,137,86,82,34,21,136,136
    ,137,1339
81  3790 DATA34,34,34,136,136,136
    ,34,34,34,136,136,136,34,34,3
    4,183,1305
95  3800 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
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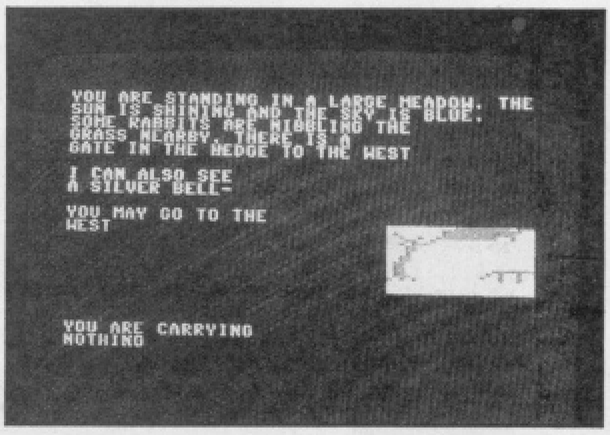


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PROGRAM:LOADER.5

AE  1 REM ************************
33  2 REM * NURSERY RHYME LAND *
AA  3 REM *      LOADER 5       *
AB  4 REM ************************
95  2000 FORL=0TO209:CX=0:FORD=0T
    015:READA:CX=CX+A:POKE13824+L
    *16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"E
    RROR IN LINE";2040+(L*10):STO
    P
0F  2020 NEXTL:END
AB  2040 DATA255,255,255,191,239,
    254,111,171,250,91,150,229,10
    1,101,213,101,2967
42  2050 DATA101,213,85,105,89,89
    ,105,89,89,89,89,89,89,85,85,
    85,1576
8D  2060 DATA85,85,88,148,34,34,3
    4,136,136,136,34,34,34,136,13
    6,136,1426
35  2070 DATA34,34,34,140,136,184
    ,63,34,242,255,203,252,0,0,0,
    255,1866
5B  2080 DATA255,255,255,255,170,
    171,254,86,150,249,85,101,185
    ,101,106,182,2860
BD  2090 DATA149,85,121,150,85,10
    1,150,153,69,88,149,1,152,167
    ,1,104,1725
EC  2100 DATA39,1,96,39,33,96,43,
    136,96,43,34,98,43,136,168,16
    3,1264
72  2110 DATA34,34,35,136,136,136
    ,34,34,34,136,136,136,34,34,3
    4,255,1378
29  2120 DATA255,255,255,253,127,
    255,182,106,255,89,85,191,149
    ,1,174,148,2780
63  2130 DATA1,109,148,0,93,148,0
    ,93,144,1,93,144,1,85,84,1,11
    45
E3  2140 DATA101,100,1,101,100,1,
    86,80,137,86,82,34,21,136,136
    ,137,1339
58  2150 DATA34,34,34,136,136,136
    ,34,34,34,136,136,136,34,34,3
    4,255,1377
61  2160 DATA255,255,255,253,127,
    255,182,106,255,89,85,191,149
    ,1,174,148,2780
9E  2170 DATA1,109,148,0,93,148,0
    ,93,144,1,93,144,1,85,84,1,11
    45
86  2180 DATA101,100,1,101,100,1,
    86,80,137,86,82,34,21,136,136
    ,137,1339
53  2190 DATA34,34,34,136,136,136
    ,34,34,34,136,136,136,34,34,3
    4,183,1305
89  2200 DATA255,255,255,234,170,
    255,150,149,191,89,85,111,169
    ,89,110,85,2652
C8  2210 DATA86,158,85,150,109,10
    2,150,89,86,37,81,218,38,64,2
    16,41,1710
D8  2220 DATA64,216,9,64,232,9,72
    ,232,9,34,232,137,136,202,42,
    34,1724
AC  2230 DATA200,136,136,34,34,34
    ,136,136,136,34,34,34,136,136
    ,136,255,1747
BB  2240 DATA255,255,255,255,170,
    171,254,86,150,249,85,101,185
    ,101,106,182,2860
5D  2250 DATA149,85,121,150,85,10
    1,150,153,69,88,149,1,152,167
    ,1,104,1725
4C  2260 DATA39,1,96,39,33,96,43,
    136,96,43,34,98,43,136,168,16
    3,1264
D3  2270 DATA34,34,35,136,136,136
    ,34,34,34,136,136,136,34,34,3
    4,191,1314
C9  2280 DATA255,255,255,253,127,
    255,182,106,255,89,85,191,149
    ,1,174,148,2780
43  2290 DATA1,109,148,0,93,148,0
    ,93,144,1,93,144,1,85,84,1,11
    45
C3  2300 DATA101,100,1,101,100,1,
    86,80,137,86,82,34,21,136,136
    ,137,1339
31  2310 DATA34,34,34,136,136,136
    ,34,34,34,136,136,136,34,34,3
    4,255,1377
82  2320 DATA255,255,255,191,239,
    254,111,171,250,91,150,229,10
    1,101,213,101,2967
C9  2330 DATA101,213,85,105,89,89
    ,105,89,89,89,89,89,89,85,85,
    85,1576
B4  2340 DATA85,85,88,148,34,34,3
    4,136,136,136,34,34,34,136,13
    6,136,1426
BA  2350 DATA34,34,34,140,136,184
    ,63,34,242,255,203,252,0,0,0,
    182,1793
60  2360 DATA255,255,255,253,127,
    255,182,106,255,89,85,191,149
    ,1,174,148,2780
0A  2370 DATA1,109,148,0,93,148,0
    ,93,144,1,93,144,1,85,84,1,11
    45
06  2380 DATA101,100,1,101,100,1,
    86,80,137,86,82,34,21,136,136
    ,137,1339
41  2390 DATA34,34,34,136,136,136
    ,34,34,34,136,136,136,34,34,3
    4,255,1377
2C  2400 DATA255,255,255,234,170,
    255,150,149,191,89,85,111,169
    ,89,110,85,2652
8B  2410 DATA86,158,85,150,109,10
    2,150,89,86,37,81,218,38,64,2
    16,41,1710
51  2420 DATA64,216,9,64,232,9,72
    ,232,9,34,232,137,136,202,42,
    34,1724
C1  2430 DATA200,136,136,34,34,34
    ,136,136,136,34,34,34,136,136
    ,136,191,1683
14  2440 DATA255,255,255,234,170,
    255,150,149,191,89,85,111,169
    ,89,110,85,2652
73  2450 DATA86,158,85,150,109,10
    2,150,89,86,37,81,218,38,64,2
    16,41,1710
49  2460 DATA64,216,9,64,232,9,72
    ,232,9,34,232,137,136,202,42,
    34,1724
2B  2470 DATA200,136,136,34,34,34
    ,136,136,136,34,34,34,136,136
    ,136,255,1747
E2  2480 DATA255,255,255,191,239,
    254,111,171,250,91,150,229,10
    1,101,213,101,2967
69  2490 DATA101,213,85,105,89,89
    ,105,89,89,89,89,89,89,85,85,
    85,1576
94  2500 DATA85,85,88,148,34,34,3
    4,136,136,136,34,34,34,136,13
    6,136,1426
CB  2510 DATA34,34,34,140,136,184
    ,63,34,242,255,203,252,0,0,0,
    179,1790
80  2520 DATA255,255,255,253,127,
    255,182,106,255,89,85,191,149
    ,1,174,148,2780
EA  2530 DATA1,109,148,0,93,148,0
    ,93,144,1,93,144,1,85,84,1,11
    45
66  2540 DATA101,100,1,101,100,1,
    86,80,137,86,82,34,21,136,136
    ,137,1339
A1  2550 DATA34,34,34,136,136,136
    ,34,34,34,136,136,136,34,34,3
    4,255,1377
B3  2560 DATA255,255,255,234,170,
    255,150,149,191,89,85,111,169
    ,89,110,85,2652
7A  2570 DATA86,158,85,150,109,10
    2,150,89,86,37,81,218,38,64,2
    16,41,1710
CE  2580 DATA64,216,9,64,232,9,72
    ,232,9,34,232,137,136,202,42,
    34,1724
BE  2590 DATA200,136,136,34,34,34
    ,136,136,136,34,34,34,136,136
    ,136,191,1683
11  2600 DATA255,255,255,255,235,
    255,254,150,169,249,85,85,229
    ,86,81,213,3111
36  2610 DATA153,80,213,153,64,21
    7,153,64,89,149,64,89,150,64,
    89,150,1941
A7  2620 DATA64,89,150,64,85,86,7
    2,101,101,34,101,101,136,101,
    101,34,1420
AD  2630 DATA103,100,136,151,86,3
    4,151,84,136,159,82,34,127,21
    6,136,255,1990
BB  2640 DATA255,255,255,254,191,
    255,213,111,255,89,91,253,22,
    86,245,5,2835
88  2650 DATA149,181,5,153,117,1,
    153,117,1,153,85,1,153,89,1,8
    9,1448
92  2660 DATA89,1,89,153,137,89,1
    53,34,89,153,136,89,153,34,89
    ,149,1637
72  2670 DATA136,89,149,34,21,149
    ,136,149,149,34,21,149,136,14
    9,85,183,1769
31  2680 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
49  2690 DATA0,0,0,0,40,32,20,170
    ,170,85,106,161,85,105,169,85
    ,1228
16  2700 DATA93,117,105,93,117,90
    ,157,93,170,117,85,106,85,85,
    89,85,1687
6C  2710 DATA85,93,95,85,93,85,85
    ,119,85,85,85,85,85,85,85,255
    ,1580
87  2720 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,32,32
38  2730 DATA0,0,168,0,168,42,22,
    160,166,85,168,53,86,192,117,
    21,1448
6E  2740 DATA212,117,84,117,220,6
    9,69,85,84,85,84,85,69,85,85,
    85,1535
26  2750 DATA81,69,17,85,21,85,85
    ,81,69,85,85,85,85,85,85,191,
    1294
A5  2760 DATA0,0,0,160,0,0,170,12
    8,0,170,170,0,170,170,0,170,1
    308
9C  2770 DATA170,0,170,170,0,170,
    234,0,171,234,0,171,234,0,171
    ,234,2129
E3  2780 DATA0,171,234,0,168,234,
    0,171,233,85,171,229,85,171,2
    13,85,2250
BC  2790 DATA171,85,85,169,85,85,
    165,85,85,149,85,85,85,85,85,
    255,1844
4C  2800 DATA0,0,0,0,0,10,0,2,170
    ,0,170,170,0,170,170,0,862
9E  2810 DATA170,170,0,170,170,0,
    170,170,0,170,170,0,170,170,8
    5,90,1875
FE  2820 DATA170,213,86,170,197,8
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    5,170,221,85,106,215,218,234,
    85,214,234,2703
3D  2830 DATA85,213,234,85,213,23
    4,85,85,90,85,85,86,85,85,85,
    183,2018
41  2840 DATA0,0,0,0,0,0,0,0,65
    ,4,16,65,4,16,85,255
F7  2850 DATA85,85,65,4,16,65,4,1
    6,161,40,24,169,170,42,170,17
    0,1286
E6  2860 DATA170,34,168,170,170,4
    2,162,174,43,232,255,175,250,
    255,255,255,2810
AB  2870 DATA255,255,254,255,255,
    255,255,255,255,255,255,255,2
    55,255,255,255,4079
19  2880 DATA0,0,0,0,0,0,0,0,65
    ,4,16,65,4,16,85,255
74  2890 DATA85,85,65,4,16,65,4,1
    6,129,36,26,161,170,42,170,17
    0,1244
8C  2900 DATA170,42,170,162,40,13
    8,40,162,138,162,175,171,235,
    191,234,255,2485
6A  2910 DATA255,255,255,255,255,
    255,255,255,255,255,255,255,2
    55,255,255,191,4016
7F  2920 DATA0,0,0,0,15;0,0,63,19
    2,0,255,252,0,63,0,0.840
13  2930 DATA0,0,0,0,64,0,37,64,1
    49,86,84,85,149,152,89,101,10
    60
56  2940 DATA160,101,86,128,85,10
    6,0,85,170,0,105,168,8,170,16
    0,0,1532
50  2950 DATA170,129,0,170,32,128
    ,170,0,0,168,10,0,160,0,0,255
    ,1391
94  2960 DATA0,0,0,0,0,0,0,0,0,
    0,15,0,0,63,0,78
04  2970 DATA0,3,1,0,0,1,88,0,21,
    149,86,38,86,85,10,89,657
58  2980 DATA101,10,149,89,2,169,
    85,2,170,85,0,170,105,160,42,
    170,1509
3E  2990 DATA0,2,170,2,8,170,0,0,
    170,0,160,170,0,0,10,247,1109

70  3000 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
76  3010 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,255,0,15,255,525
2F  3020 DATA240,255,119,254,255,
    253,254,223,255,250,127,254,1
    70,255,234,170,3568
C6  3030 DATA255,170,170;255,170,
    170,127,234,170,223,250,170,2
    55,254,170,255,3298
98  3040 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
7E  3050 DATA0,0,0,0,0,0,0,0,0,63
    ,240,3,223,252,63,127,971
90  3050 DATA255,253,255,255,175,
    255,223,170,255,255,171,245,2
    55,175,255,255,3707
68  3070 DATA175,255,255,191,127,
    255,175,215,255,170,253,255,1
    70,175,255,191,3372
C7  3080 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
0F  3090 DATA0,0,0,0,0,0,0,0,15,2
    52,0,63,247,192,255,253,1277
EE  3100 DATA252,255,255,127,247,
    255,250,255,255,170,255,95,23
    4,255,255,250,3665
F5  3110 DATA255,255,250,255,253,
    254,255,215,250,255,127,170,2
    55,250,170,255,3724
EF  3120 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
93  3130 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,255,0,15,255,525
9F  3140 DATA240,191,221,255,191,
    127,255,175,255,247,170,191,2
    53,170,171,255,3367
5B  3150 DATA170,170,255,170,170,
    255,170,171,253,170,175,247,1
    70,191,255,183,3175
17  3160 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
3B  3170 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,255,0,15,255,525
56  3180 DATA240,255,119,254,255,
    253,254,223,255,250,127,254,1
    70,255,234,170,3568
A9  3190 DATA255,170,170,255,170,
    170,127,234,170,223,250,170,2
    55,254,170,255,3298
3F  3200 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
31  3210 DATA0,0,0,0,0,0,0,0,0,63
    ,240,3,223,252,63,127,971
FF  3220 DATA255,253,255,255,175,
    255,223,170,255,255,171,245,2
    55,175,255,255,3707
2B  3230 DATA175,255,255,191,127,
    255,175,215,255,170,253,255,1
    70,175,255,191,3372
E4  3240 DATA0,0,0,0,0,21,64,5,
    85,86,82,165,153,86,90,837
05  3250 DATA89,166,22,101,105,22
    ,149,90,10,20,26,10,0,10,40,0
    ,860
77  3260 DATA50,40,0,242,40,3,200
    ,40,3,192,160,15,192,32,63,0,
    1272
79  3270 DATA8,63,0,0,15,192,0,63
    ,240,0,255,192,3,255,240,255,
    1781
86  3280 DATA0,0,0,85,85,64,85,85
    ,85,105,85,149,89,86,85;86,11
    74
82  3290 DATA86,106,86,89,149,149
    ,149,149,133,166,81,129,166,6
    4,128,170,2000
89  3300 DATA2,128,40,2,32,40,2,3
    2,40,2,0,42,2,0,42,8,414
97  3310 DATA0,170,8,0,138,0,2,0,
    128,0,0,32,0,0,0,181,659
1E  3320 DATA0,0,0,85,85,64,85,85
    ,85,105,85,149,89,86,85,86,11
    74
8B  3330 DATA86,106,86,89,149,149
    ,149,149,133,166,81,129,166,6
    4,128,170,2000
0C  3340 DATA2,128,40,2,32,40,2,3
    2,40,2,0,42,2,0,42,8,414
41  3350 DATA0,170,8,0,138,0,2,0,
    128,0,0,32,0,0,0,255,733
77  3360 DATA0,0,0,0,0,0,80,1,84,
    133,149,85,149,102,90,154,102
    7
23  3370 DATA101,165,105,89,148,1
    65,86,148,164,20,160,160,0,16
    0,191,192,2054
B9  3380 DATA40,143,192,40,47,240
    ,40,3,240,40,15,240,10,15,252
    ,8,1565
C0  3390 DATA3,252,32,3,255,0,15,
    255,0,15,255,192,63,255,240,1
    91,2025
06  3400 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
90  3410 DATA0,0,0,0,0,0,0,15,2
    52,0,63,247,192,255,253,1277
BF  3420 DATA252,255,255,127,247,
    255,250,255,255,170,255,95,23
    4,255,255,250,3665
04  3430 DATA255,255,250,255,253,
    254,255,215,250,255,127,170,2
    55,250,170,255,3724
2E  3440 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
E0  3450 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,255,0,15,255,525
26  3460 DATA240,191,221,255,191,
    127,255,175,255,247,170,191,2
    53,170,171,255,3367
2A  3470 DATA170,170,255,170,170,
    255,170,171,253,170,175,247,1
    70,191,255,183,3175
B9  3480 DATA0,0,0,0,0,21,64,5,
    85,86,82,165,153,86,90,837
08  3490 DATA89,166,22,101,105,22
    ,149,90,10,20,26,10,0,10,40,0
    ,860
A5  3500 DATA51,40,0,255,40,3,206
    ,40,3,206,160,15,207,32,63,15
    ,1336
F6  3510 DATA8,63,15,0,15,192,0,6
    3,240,0,255,192,3,255,240,255
    ,1796
0F  3520 DATA0,0,0,85,64,4,101,14
    9,21,101,175,255,149,111,255,
    148,1618
42  3530 DATA15,255,80,14,255;0,1
    5,255,0,14,255,239,15,255,239
    ,206,2112
FF  3540 DATA255,187,255,255,251,
    255,215,251,255,215,187,255,2
    15,251,255,215,3772
57  3550 DATA239,255,215,239,192,
    215,0,0,0,0,0,0,0,0,191,154
    6
3F  3560 DATA0,0,0,0,0,0,80,1,84,
    133,149,85,149,102,90,154,102
    7
9B  3570 DATA101,165,105,89,148,1
    65,86,148,164,20,160,160,0,16
    0,191,192,2054
D1  3580 DATA40,143,192,40,47,240
    ,40,3,240,40,15,240,10,15,252
    ,8,1565
9B  3590 DATA3,252,32,3,255,0,15,
    255,0,15,255,192,63,255,240,2
    55,2090
38  3600 DATA0,0,0,85,85,64,85,85
    ,85,105,85,149,89,86,85,86,11
    74
64  3610 DATA86,106,86,89,149,149
    ,149,149,133,166,81,129,166,6
    4,128,170,2000
93  3620 DATA2,128,40,2,32,40,2,3
    2,40,2,0,42,2,0,42,8,414
E6  3630 DATA0,170,8,0,138,0,2,0,
    128,0,0,32,0,0,0,179,657
CA  3640 DATA173,134,2,72,32,18,6
    4,32,72,64,32,98,64,104,141,1
    34,1236
09  3650 DATA2,96,173,62,3,10,24,
    105,126,141,248,7,24,105,1,14
    1,1268
CE  3660 DATA249,7,169,3,141,21,2
    08,141,29,208,141,23,208,141,
    29,208,1925
72  3670 DATA169,130,141,1,208,14
    1,3,208,169,240,141,0,208,169
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    ,32,141,2101
93  3680 DATA2,208,169,2,141,16,2
    08,95,172,62,3,136,185,176,64
    ,141,1781
56  3690 DATA37,208,185,26,65,141
    ,38,208,185,229,64,141,39,208
    ,141,40,1955
B6  3700 DATA208,96,174,62,3,202,
    189,222,66,133,251,189,169,66
    ,133,252,2415
87  3710 DATA160,0,140,133,3,177,
    251,141,134,2,173,133,3,24,10
    5,10,1589
AC  3720 DATA170,150,27,24,32,240
    ,255,169,141,160,66,32,30,171
    ,238,133,2048
DC  3730 DATA3,172,133,3,192,5,20
    8,221,162,15,160,27,24,32,240
    ,255,1852
AC  3740 DATA172,133,3,177,251,14
    1,134,2,169,156,160,66,32,30,
    171,96,1893
BF  3750 DATA5,5,5,5,13,5,8,8,5,5
    ,5,5,5,5,5,5,94
25  3760 DATA5,5,8,8,8,8,1,5,5,5,
    5,5,5,5,5,5,88
4D  3770 DATA5,13,13,13,13,9,9,5,
    13,13,11,11,11,11,11,11,172
0C  3780 DATA11,11,11,11,5,9,9,9,
    9,9,9,9,13,9,9,9,152
E2  3790 DATA9,9,9,9,9,9,15,10,14
    ,15,15,5,9,12,9,12,170
D3  3800 DATA12,8,8,12,8,8,5,5,5,
    5,13,8,6,9,9,12,133
4C  3810 DATA12,12,12,12,12,12,12
    ,12,12,13,7,1,1,1,5,5,141
B4  3820 DATA5,5,13,13,13,13,13,1
    3,13,1,1,1,1,1,1,9,116
A5  3830 DATA13,1,13,13,13,9,6,13
    ,9,6,13,1,1,9,8,5,133
CE  3840 DATA0,13,5,5,0,15,15,15,
    15,15,15,15,15,15,9,6,173
87  3850 DATA14,3,3,13,13,6,14,7,
    7,7,7,6,14,7,7,7,135
A4  3860 DATA7,6,14,7,7,7,7,6,6,6
    ,6,6,6,5,6,5,109
B8  3870 DATA6,6,6,6,6,6,6,6,6,6,
    14,7,7,7,7,6,108
4A  3880 DATA6,6,8,8,8,6,6,6,8,8,
    8,5,6,8,8,8,114
0C  3890 DATA8,6,6,8,8,8,8,6,6,8,
    8,8,8,6,6,8,116
2D  3900 DATA8,8,8,6,6,8,8,8,8,6,
    14,15,15,15,15,6,154
99  3910 DATA14,15,15,15,15,0,0,4
    ,10,7,7,1,2,2,2,0,109
A6  3920 DATA0,1,3,3,3,3,3,1,12,1
    2,12,12,12,1,12,12,102
11  3930 DATA12,12,12,6,14,2,2,12
    ,12,6,14,15,15,15,15,6,170
52  3940 DATA14,3,15,15,15,6,14,3
    ,15,15,15,6,14,3,15,15,183
85  3950 DATA15,6,14,13,13,13,13,
    6,14,13,13,13,13,6,14,3,182
20  3960 DATA13,13,13,6,14,13,13,
    13,13,6,14,13,13,13,13,6,189
CF  3970 DATA14,3,15,15,15,6,14,3
    ,3,3,3,6,14,3,3,3,123
FE  3980 DATA3,6,14,3,3,3,3,6,14,
    3,3,3,3,6,14,7,94
68  3990 DATA7,7,7,0,0,0,0,12,12,
    6,14,8,8,8,8,6,103
91  4000 DATA14,8,8,8,8,6,14,8,8,
    8,8,15,15,15,15,15,173
54  4010 DATA15,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,15
70  4020 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
7E  4030 DATA0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
CD  4040 DATA0,5,5,5,0,0,0,6,14,1
    ,1,1,1,18,32,32,121
44  4050 DATA32,32,32,32,32,32,32
    ,32,32,32,146,0,183,183,183,1
    83,1198
D5  4060 DATA183,183,183,183,183,
    183,183,183,0,65,65,65,65,65,
    65,65,1919
98  4070 DATA65,65,65,65,65,65,65
    ,65,65,65,65,65,65,65,65,65,1
    040
1B  4080 DATA65,55,65,65,65,65,65
    ,66,66,66,66,66,66,66,66,66,1
    049
42  4090 DATA66,66,66,66,66,66,66
    ,66,66,66,66,66,66,66,79,85,1
    088
65  4100 DATA91,97,103,109,115,12
    1,127,133,139,145,151,157,163
    ,169,175,181,2176
B7  4110 DATA187,193,199,205,211,
    217,223,229,235,241,247,253,3
    ,9,15,21,2688
22  4120 DATA27,33,39,45,51,57,63
    ,69,75,81,87,93,99,105,111,11
    7,1152
F2  4130 DATA123,129,135,0,0,0,0,
    0,0,0,0,0,0,0,0,0,387
```

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Popper

On a light-hearted note, we bring you a game featuring Popper the green pea. Have fun!

By Ian Potts

As Popper the popping pea you must explore the sixty-four rooms of each of the Green Giant's castles in search of the Popper juniors that he has kidnapped.

Each castle has eight floors, each eight rooms wide and on each floor you will find a junior Popper. When you have found all eight Poppers in each castle you must put them back into their pod.

However life is not all that easy because the Green Giant has sent many baddies to hinder your progress.

To get from one floor of the castle to another you must pop through a hole in the floor, but make sure that you have found the Popper junior on that floor because there is no way back up again. Beware of multiple holes positioned beneath each other because you will be unable to find all the Popper juniors and put them in their pod.

When you get all the Poppers in the pod go on to the next castle to rescue even more poppers from the clutches of the Green Giant.

Controls for Play

To move Popper about the castle use a joystick in port 2. Press fire to start a game and push left and right to guide Popper.

To load Popper, press Shift and Run/Stop and press PLAY on the tape deck. The game will load and run automatically.

Note

To type in the game, please use the *Your Commodore* Hex Data Entry Program. Check the Contents page to find out exactly where it is in this issue.

YC

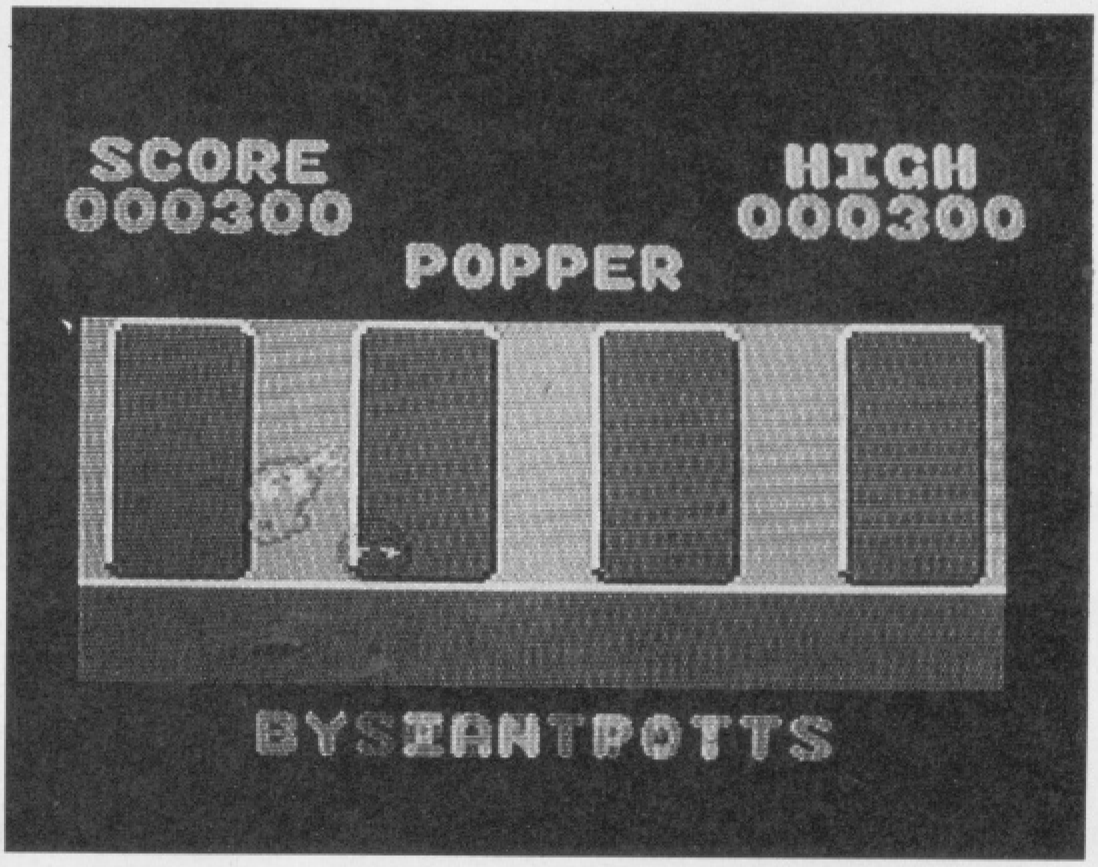
```
PROGRAM: POPPER
USE HEX DATA ENTRY TO TYPE THIS IN.

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0809 A7 41 B2 31 3A 93 22 50 :0D
0811 4F 50 20 47 52 41 50 48 :0B
0819 49 43 53 22 2C 31 2C 31 :26
0821 00 2C 08 14 00 9E 32 31 :7A
0829 30 30 00 00 00 00 00 00 :B8
0831 00 00 00 A9 46 8D 18 03 :40
0839 A9 08 8D 19 03 A9 08 20 :39
0841 D2 FF 20 91 19 20 4E 18 :D3
0849 A9 0B 8D 11 D0 20 3D 0A :BD
0851 20 B8 0B A9 01 8D 96 20 :12
0859 A9 00 8D 67 19 8D 66 19 :A1
0861 AD 1E D0 20 2B 12 A2 00 :EA
0869 A0 00 88 D0 FD CA D0 FA :0D
0871 A9 00 8D 96 20 A9 1B 8D :D3
0879 11 D0 A2 04 A0 00 88 D0 :77
0881 FD CA D0 FA AD 77 22 F0 :02
0889 1F A9 01 8D 8A 19 20 96 :08
0891 1D 20 B8 19 20 B8 19 20 :18
0899 B8 19 20 B8 19 20 B8 19 :CF
08A1 AD 8A 19 D0 FB 4C 3E 1F :45
08A9 AD 6A 19 F0 1B A9 00 8D :19
08B1 6A 19 20 B8 19 A9 01 8D :6E
08B9 8A 19 20 88 1D 20 C0 1D :6D
08C1 AD 8A 19 D0 FB 20 B2 1D :79
08C9 AD 67 19 F0 11 A9 02 8D :0F
08D1 8A 19 20 7A 1D 20 8A 16 :9B
08D9 20 B2 1D 4C FD 1D AD 4F :B5
08E1 0E D0 97 AD 54 0E C9 02 :8E
08E9 F0 90 AE 57 0E BD BC 22 :46
08F1 F0 88 AD 10 D0 29 01 D0 :C4
08F9 25 AD 08 D0 C9 A8 30 1E :EC
0901 C9 B0 10 1A AD 01 D0 C9 :20
0909 A8 30 13 A9 02 8D 54 0E :01
0911 20 5E 1D 20 C1 19 A9 0F :35
0919 8D 1B D0 4C 7B 08 4C 7B :FE
0921 08 AD 4F 0E F0 08 AD 51 :CA
0929 0E D0 53 4C D2 09 AD 54 :AA
0931 0E F0 15 C9 01 F0 11 AE :0D
0939 57 0E BD BC 22 F0 01 60 :23
0941 AD 01 D0 C9 A8 30 01 60 :F2
0949 AD 00 DC 29 04 D0 4C 20 :35
0951 EF 09 AD 10 D0 29 01 D0 :25
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0961 CE 55 0E AD 55 0E C9 FF :2A
0969 D0 07 EE 55 0E 20 11 0A :31
0971 60 EE 55 0E A9 01 8D 51 :99
0979 0E A9 02 8D 4F 0E AD 10 :2C
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0991 0E CE 55 0E CE 57 0E 20 :E3
0999 2B 12 60 AD 00 DC 29 08 :42
09A1 D0 4B 20 11 0A AD 10 D0 :DA
09A9 29 01 F0 41 AD 00 D0 C9 :00
09B1 42 D0 3A EE 55 0E AD 55 :58
09B9 0E C9 08 D0 07 CE 55 0E :6A
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09C9 00 8D 51 0E A9 02 8D 4F :B9
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09E9 57 0E 20 2B 12 60 A2 00 :6F
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0A41 FC 09 02 8D 00 DD A9 02 :65
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0A89 43 A9 42 8D FA 43 A9 43 :42
0A91 8D FB 43 A9 48 8D FC 43 :32
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0AD9 00 44 9D 00 40 BD FA 44 :D8
0AE1 9D FA 40 BD F4 45 9D F4 :72
0AE9 41 BD EE 46 9D EE 42 E8 :38
0AF1 E0 FA D0 D5 AD 16 D0 09 :65
0AF9 10 8D 16 D0 A9 01 8D 22 :E2
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0B09 A9 09 9D 18 41 9D 08 42 :35
0B11 9D 58 42 A9 0D 9D 18 D9 :26
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0B29 2F 0E 9D 18 41 E8 C8 C0 :D7
0B31 0A D0 F4 E0 2A D0 EE A9 :82
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0B59 FB 18 69 28 85 FB A5 FC :3C
0B61 69 00 85 FC EE 4D 0E AD :86
0B69 4D 0E C9 08 D0 D6 A0 02 :D0
0B71 A2 00 BD 43 0E 91 FB C8 :1E
0B79 E8 E0 0A D0 F5 C0 2A D0 :6D
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0BA9 57 0E 8D 55 0E 8D 56 0E :74
0BB1 8D 8A 19 8D 90 19 60 A2 :E6
0BB9 00 BD 23 10 9D 7B 22 BD :A4
0BC1 E3 0F 9D BC 22 E8 E0 40 :C2
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0C01 20 5C 0C 60 A2 00 AD 4E :D1
0C09 0E 9D 18 D9 9D 08 DA 9D :18
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1019 00 01 00 00 00 00 00 00 :1A
1021 00 00 00 02 02 01 00 02 :4B
1029 03 04 03 04 02 05 01 06 :AB
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1161 00 00 00 A2 00 A9 01 9D :CD
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1171 00 A9 04 9D 40 3C 9D 30 :B5
1179 3D 9D 20 3E 9D 10 3F E8 :B1
1181 E0 F0 D0 ED A9 00 AE 56 :23
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11A9 A5 FD 85 F9 A5 FE 85 FA :5A
11B1 A2 00 A0 00 B1 F9 9D D0 :48
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11C1 F9 18 69 40 85 F9 A5 FA :E6
11C9 69 01 85 FA E0 78 D0 E2 :9A
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1FC1 22 D0 F2 A9 00 8D 7A 22 :B0
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2001 BD 24 11 9D BC 22 E8 E0 :7C
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2011 8D E3 10 A2 00 BD 23 10 :FE
2019 9D 78 22 BD E3 0F 9D BC :F9
2021 22 E8 E0 40 D0 EF A9 00 :FB
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2041 20 5C 0C 4C 54 08 AD 78 :BB
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2089 AD 03 D0 C9 A0 D0 E0 A9 :37
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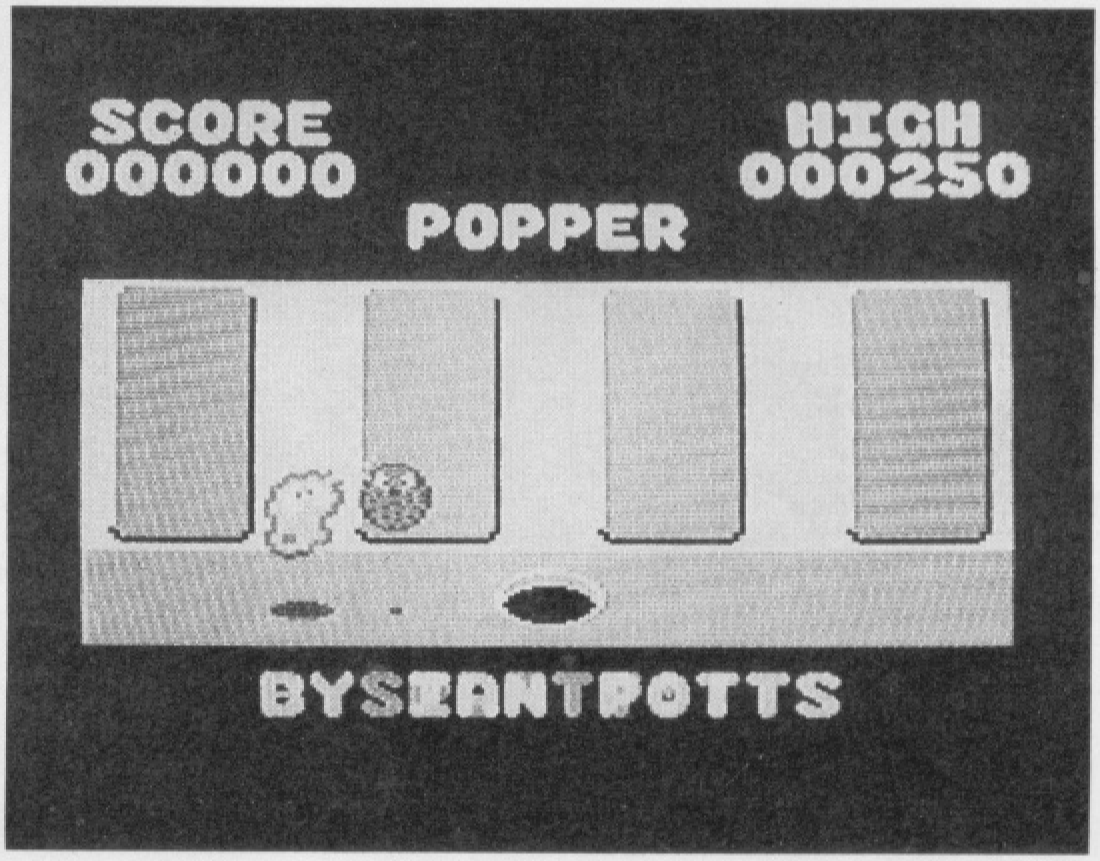


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2121 32 33 46 47 2A 2B A5 A6 :2D
2129 04 04 04 04 04 04 04 04 :B8
2131 04 04 04 04 04 04 04 04 :C0
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2149 10 11 5C 5D 5C 5D A7 A8 :CD
2151 A7 A8 04 04 04 04 04 04 :CB
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2169 04 04 5A 5B 4E 4F 3E 3F :FB
2171 12 13 5E 5F 5E 5F A5 A6 :01
2179 A5 A6 04 04 04 04 04 04 :ED
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2191 04 04 4C 4D 20 21 10 11 :12
2199 58 59 04 04 A5 A6 04 04 :17
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21C9 4A 4B 04 04 04 04 04 04 :2C
21D1 04 04 04 04 04 04 04 04 :60
21D9 04 04 04 04 04 04 04 04 :68
21E1 68 69 20 21 3C 3D 3C 3D :24
21E9 04 04 1C 1D 48 49 44 45 :DE
21F1 20 21 A7 A8 04 04 04 04 :4F
21F9 04 04 04 04 04 04 04 04 :88
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2209 6A 6B 22 23 3E 3F 3E 3F :94
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2219 22 23 A5 A6 04 04 04 04 :6F
2221 04 04 04 04 04 04 04 04 :B0
2229 04 04 04 04 04 04 04 04 :B8
2231 48 49 60 61 54 55 04 04 :8C
2239 2C 2D 20 21 54 55 48 49 :84
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2249 04 04 04 04 04 04 04 04 :D8
2251 04 04 04 04 04 04 04 04 :E0
2259 4A 4B 62 63 56 57 04 04 :DE
2261 2E 2F 22 23 56 57 4A 4B :F4
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PROGRAM:POP GRAPHICS
USE HEX DATA ENTRY TO ENTER THIS PROGRAM.

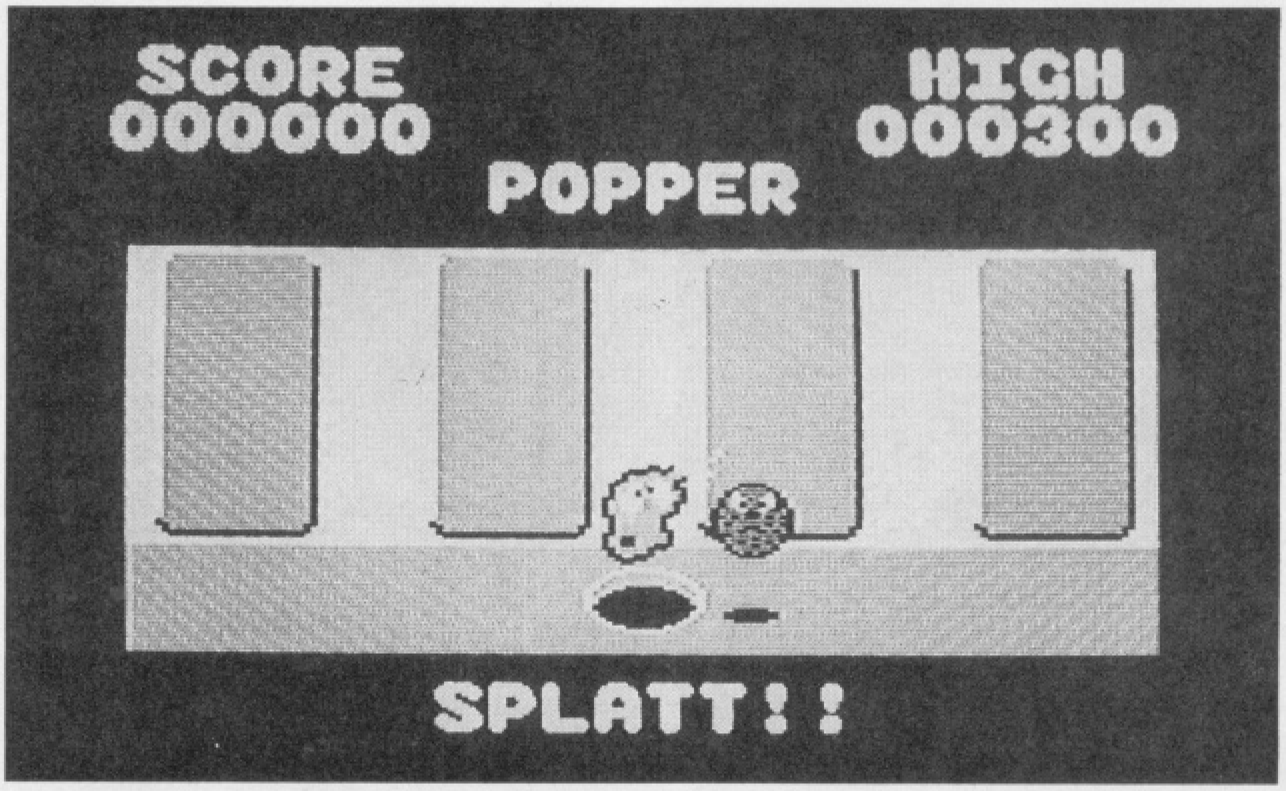
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4448 32 33 2A 2B 2E 2F 04 04 :46
4450 48 49 48 49 48 49 48 49 :84
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44B0 48 49 4C 4D 4C 4D 20 21 :D4
44B8 54 55 04 04 04 04 04 04 :3A
44C0 04 04 04 04 04 04 04 04 :50
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44D0 04 04 04 04 04 04 4E 4F :BE
44D8 4A 4B 4E 4F 4E 4F 22 23 :44
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4628 04 04 04 04 04 04 04 04 :B8
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4638 04 04 04 28 29 10 11 40 :94
4640 41 20 21 04 04 24 25 54 :C3
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46A8 04 04 04 04 04 04 04 04 :38
46B0 04 04 04 04 04 04 04 04 :40
46B8 04 04 04 04 04 04 04 04 :48
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46E0 48 49 3C 3D 58 59 48 49 :70
46E8 24 25 5C 5D 04 04 04 04 :46
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4880 F8 E0 C0 C0 81 83 83 80 :A4
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48A8 0F 03 01 01 81 C1 03 03 :FC
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48B8 C1 81 01 01 03 0F FF FF :DC
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4C78 C1 E1 C1 03 07 1F FF FF :18
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50E8 AB 00 AA AF 00 AA AC 00 :FD
50F0 AA BC 00 AA F0 00 AF C0 :33
50F8 00 FF 00 00 F0 00 00 00 :A6
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5270 3A EA EC 0E AE B0 0E AA :B2
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52C0 00 FF 00 03 AA C0 0E AA :4E
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52E0 AB EA EB AB EA BE AB EA :CF
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52F0 3A AA AC 0E AA B0 0E AA :DE
52F8 B0 03 AA C0 00 FF 00 00 :A6
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5350 00 00 00 00 00 00 00 00 :50
5358 00 00 00 00 00 00 00 38 :18
5360 00 01 DD 00 03 DD C0 1D :5E
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5388 00 00 00 00 00 00 00 00 :88
5390 00 00 00 00 00 00 00 00 :90
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53B0 9F 6E EC FF 6D EC F7 43 :6D
53B8 EC 0E 81 D8 3E 00 B0 00 :A9
53C0 00 00 00 00 00 00 00 00 :C0
53C8 00 00 00 00 00 00 00 00 :C8
53D0 00 00 00 00 00 00 00 00 :D0
53D8 00 00 00 00 00 00 00 00 :D8
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5438 EF 37 01 70 1A 00 7C 00 :3E
5440 00 00 00 00 00 00 00 00 :40
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5498 FE 00 00 FC 00 00 FC 07 :A2
54A0 FE FC 0F FF FE 0F FF 7E :F8
54A8 07 FE 7F 01 F8 3F C3 F8 :93
54B0 3F FF F8 1F FF F0 0F FF :4D
54B8 E0 03 FF 80 00 FE 00 7B :67
54C0 00 FF 00 03 FF C0 07 FF :6E
54C8 E0 07 FF E0 0F FF F0 0F :80
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54D8 1F C3 F8 1F 81 F8 3F 81 :F7
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54E8 FF FE 7F FF FE 7F FF FE :35
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5520 7F FE 7E 7F FE 3C 7F FE :D8
5528 3C 7F FE 18 7F FE 18 7F :C8
5530 FE 00 7F FE 00 7F FE 00 :8F
5538 7F FE 00 7F 7C 00 3E 00 :CD
5540 7F FF FE FF FF FF FF FF :99
5548 FF FF FF FF FF FF FE FE :15
5550 00 00 FC 00 00 FE 00 00 :38
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5578 FF FF FF FF 7F FF FE 00 :D5
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55A0 3F FC 00 3F FE 00 7F 7E :32
55A8 00 7E 7F 00 FE 3F C3 FC :C6
55B0 3F FF FC 1F FF F8 0F FF :89
55B8 F0 03 FF C0 00 FF 00 00 :A5
55C0 78 00 1E FC 00 3F FC 00 :E0
55C8 3F FC 00 3F FE 00 7F 7E :5A
55D0 00 7E 7E 00 7E 7F 00 FE :A6
55D8 3F 00 FC 3F 00 FC 3F 81 :B0
55E0 FC 1F 81 F8 1F C3 F8 1F :6A
55E8 C3 F8 0F C3 F0 0F E7 F0 :AF
55F0 0F FF F0 07 FF E0 07 FF :4D
55F8 E0 03 FF C0 00 FF 00 00 :D5
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5628 FF F0 FF FF C0 FE 3F E0 :6D
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56A8 6A C0 95 AA C0 95 AA F0 :5D
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56E8 FA AA 00 3A AA 00 3A AA :56
56F0 00 3A AA 00 3E AA 00 0F :0C
56F8 EB 00 03 FF 00 00 3C 00 :8C
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57A8 6A C0 95 6A C0 A5 AA C0 :3D
57B0 A9 AB C0 AA AB 00 AA AB :EC
57B8 00 AA AB 00 AA AF 00 00 :79
57C0 0E AA AA 0E AA AA 0F AA :5F
57C8 AA 03 AA AA 03 AA AF 03 :0A
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57D8 00 FA AA 00 3A AA 00 FA :B8
57E0 AA 00 EA AA 00 EA AA 00 :12
57E8 FA AA 00 3A AB 00 3A AF :83
57F0 00 3A AC 00 3E BC 00 0F :7E
57F8 F0 00 03 C0 00 00 00 00 :F1
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5818 AA AB C0 AA AB 00 AA AF :75
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5828 BC 00 EA B0 00 FE B0 00 :26
5830 3F F0 00 03 C0 00 00 00 :1B
5838 00 00 00 00 00 00 00 00 :38
5840 00 00 00 00 00 00 00 00 :40
5848 00 00 00 00 00 00 00 00 :48
5850 00 00 00 00 0F 00 00 3F :93
5858 00 00 3A 00 00 FA 00 03 :FA
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5868 03 97 00 0F 95 00 0E 95 :C8
5870 00 0E 95 00 0E 95 00 0E :7F
5878 A6 00 0F AA 00 03 AA 00 :AB
5880 00 01 00 00 00 01 00 10 :08
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58B0 A9 B0 00 AA B0 00 AA F0 :F7
58B8 00 AB C0 00 AB 00 00 00 :A5
58C0 00 03 AA 00 03 AA 00 03 :E7
58C8 AA 00 0F AA 00 0E BE 00 :CD
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58D8 00 03 AA 00 03 EB 00 00 :6D
58E0 FF 00 00 3C 00 00 00 00 :CF
58E8 00 00 00 00 00 00 00 00 :E8
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59B8 B0 03 AA C0 00 FF 00 00 :66
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59C8 AC EA AA AB EA AA AB 39 :F5
59D0 AA 6C 39 69 6C 0D 55 70 :DE
59D8 0D D7 70 3A 55 AC EA 96 :92
59E0 AB EA BE AB EA BE AB EE :68
59E8 AA BB EB FF EB 3A AA AC :BE
59F0 3A AA AC 0E AA B0 03 AA :91
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5A10 3A AA 00 FA AA 00 EA AA :8E
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5A38 AA 3A AA AA 3A AA AA 00 :C0
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5B10 03 AC 00 03 AC 00 03 AC :48
5B18 00 03 AB 00 03 AB 00 03 :48
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5B30 00 0E 6B 00 0E 6B 00 3A :25
5B38 6B 00 3A 6B 00 3A 6C 00 :4D
5B40 00 3A 6C 00 39 AC 00 39 :E5
5B48 AC 00 39 AC 00 39 AC 00 :59
5B50 E9 AC 00 E9 B0 00 E6 B0 :6F
5B58 00 E6 B0 03 A6 B0 03 9A :83
5B60 C0 03 9A C0 0E 9A C0 0E :86
5B68 6B 00 3A 6B 00 39 AC 00 :37
5B70 EA AC 00 EA B0 00 EA C0 :30
5B78 00 3F 00 00 00 00 00 00 :F6
5B80 00 00 D0 8D 15 D0 A9 A0 :0C
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Contributions

So you own a Commodore? So you've written some programs? So why haven't you sent them to us?

Your Commodore is always on the look out for new programs, hints and tips, articles and even regular series. In fact if you have something that you think could be of use to other Commodore owners we want to hear about it.

So if you have got something which you think we may be interested in. How do you go about submitting it to us?

Below you will find a list of guidelines that will help us to deal with any item that you send in to us. We don't expect everybody to be the next William Shakespeare but if you do follow these simple rules then it will make our job a lot easier.

1) If possible all material sent to the magazine should be typed or printed out on a computer printer.

2) All text should be double spaced i.e. there should be a blank line between each line of text. You should also leave a margin of about 10 characters around the text.

3) On the very first page you should put the following:
Name of the article
Machine that it is for
Any extras required – disk, printer etc.
Your name
Your address
Your telephone number

4) The top of every page should have the following information on it:
Abbreviation of the article title
Your name
The page number

For example, suppose you had submitted an article on C64 interrupts. You should put something like the following at the head of the page:

Interrupts/J.Smith/1

5) Please make sure that you do not make any additional marks on your text especially underlining.

6) Try and write in clear concise English, it does not have to be a work of literature but it must be comprehensible.

7) On the bottom of each page you should put the word MORE if there are more pages to the article or ENDS if it is the last page.

8) If possible, enclose a listing of all programs.

9) Under no circumstances use a staple to hold the pages together. Use a paperclip instead.

10) Programs should be included on either disk or tape. Make sure that you SAVE two copies of every program so that we have a better chance of loading them if problems occur.

11) Programs under 10 lines can be included in the text. If your program is longer than this you must enclose a disk or cassette.

12) If your article needs any artwork then supply clear examples of what is needed. We don't expect you to be an artist but we do need to see what is required.

13) Photographs, if necessary, must be either black and white prints or colour slides. We can take shots ourselves so don't worry about this too much.

14) Submissions of any length are welcome. If you have a five line routine that you think may be of use to someone else we welcome it just as much as a full blown six part series.

15) Payment varies quite a lot and depends on quite a number of factors, such as complexity of program, presentation of program, number of magazine pages it takes up etc. Payment is generally between £10.00 and £800.00.

16) All payments are made in the month that the magazine containing your article has appeared in print.

17) If we do find your submission suitable for inclusion in the magazine we will write to you giving the terms of publication, the rate of payment and an agreement form. Prompt return of this form will allow us to use your program as soon as possible.

18) If you want the program returning to you, should we find it unsuitable for publication, then you should enclose a stamped self addressed envelope.

19) The last and most important point to make is 'get writing', we are waiting for your articles.

Pirate Power

If you're a Basic programmer looking for new tools then this Basic Extension from Pirate Software may be just what you're after.

By Evelyn Mills

Extension 64 is a program which will extend your Basic into a form which is both compact and efficient. Naturally you will require to restructure your ideas on programming, but commands have been streamlined to an extent which is quite remarkable. To select a random example from the 120 or so extra commands available, 'STIX 2,2' will give a joystick response on both the x and y axes.

On loading you will find that you have 30 plus K available for programming, the whole being entirely compatible with standard Basic if you so wish. Effectively, *Extension* 64 is primarily intended to enable you to manipulate sprites and music with greater ease and this it most certainly does. There are, of course, many other inbuilt features but these are the two which should impress you most.

You may be daunted by the Manual, however demos are available on both cassette and disk and, if you follow the MAZE Demonstrating through in the supplementary listing provided, you should get to grips with this incredibly simple program structure. Plenty of examples are provided in the Manual and the cross-references are good.

Sprites

So what does all this do? SPRITES may be animated with a one line command, while boundary limits can be set to bounce your sprites around in a variable fashion. Up to 64 sprites may be displayed on the screen at any one time, working on a basis of seven sets and eight sprites. I would recommend that one set is sufficient for starters. Sprites may be rotated, flipped around, made to 'chase' each other (FLEE command!) or halted (HALTON).

In the event that you do not have a sprite generator, there is an excellent one provided which operates via keyboard or joystick. The SPREGEN (generator) has a very good screen display, allows for flipping, multi-colour display and saves the data to tape or disk for recall if required. Data files may be created in this way. All of the functions and displays are well documented in the Manual: please take note of how to reload your sprite data!

Music

Now to MUSIC. In the demo section you will find a program called ROUND. The tone and quality of the music is excellent; let this demo run on until the music has finished and you will find a 'keyboard' with three Boogie Rhythms incorporated which can give you a lot of fun – full screen directions here.

To program music however, back to the manual: the main references to head for here are VOICE and PLAY; these sections contain full data on how to control waveform, modulation, frequency, synchronisation etc. To find out how to program such data and to output a one or three voice melody, again refer to the demo programs. You will be surprised at the simplicity of operation.

Other Features

Now to the CHRGEN or character generator. This is a fairly standard procedure for redefinition of characters (nice and compact) and a full set of redefined characters may be saved and reloaded for further programming.

Hires graphics are not forgotten; line drawing, circling and boxing are all present, with a choice of modes, colour, and pens. There are full instructions for a SPLIT SCREEN mode allowing multicolour bit map graphics and text to be used together.

I did say that there are over 120 commands – look up the Quick Reference Index and you will find them there – Print at, Color at, Shrinking, Scrolling, Restore to a line number (very useful), Screen blanking, Autonumbering, Block deletion etc. Somethings old and a lot new.

The most impressive feature of EX-64 is its compactness of commands: use it in conjunction with Basic and you have here a very powerful programming tool indeed to give you maximum effect with minimal effort. Remember that this a programmer's program.

Touchline
Program: *Extension 64,* ***Company:*** *Pirate Software, 24 Badger Lane, Ingleby Barwick, Stockton-On-Tees, Cleveland.* ***Tel:*** *0642 762540.* ***Price:*** *£7.95 tape, £9.40 disk, £17.95 cartridge.*

Bare Facts

Inside the Commodore range of computers there are a variety of machine code routines that are available to the user. We look at what they are and how to use them.

Whenever any action is taken on a Commodore computer an internal machine code routine actually handles the action. For example there is a routine in the computers that prints out the character in the A register to the current output device.

All of these routines sit in a Read Only Memory (ROM) inside the computer called the Kernal. These routines are therefore referred to as Kernal Routines.

Commodore, in infinite wisdom, has placed the routines on each of their computers in the same area of memory, obviously not all machines have the same routines, but where they are the same they sit at the same place. Knowing what these routines do and where they sit in the computer's memory is extremely important when writing machine code programs or transferring a program from one machine to another.

Below you will find a complete list of all the major Kernal routines. This should aid you in writing your own machine code programs and converting from one machine to another.

ACPTR

Purpose: Get a byte from the serial bus.
Call address: $FFA5
Output parameter: A
Machines: All

Whenever you wish to get data from the serial bus this is the routine to use. This routine gets a byte of data and places it in the A register. Before using this routine the TALK routine must be used to tell the device on the serial bus to send data. If the input device requires a secondary command you must send this with the TSKA routine before using this one.

BOOTCALL

Purpose: Boot the disk
Call address: $FF53
Input parameter: X
Machine: C128

When called this routine will boot any auto start disk that is in the drive. The X register should contain the device number of the drive.

C64 MODE

Purpose: Enable the C64 mode
Call address: $FF4D
Machine: C128

A call to this routine causes a C128 in C128 mode to switch into C64 mode.

CHKIN

Purpose: Open a channel for input
Call address: $FFC6
Input parameter: X
Machines: All

This defines a logical file for input. The file must have already been opened by using the OPEN Kernal routine. If you are wanting to receive data from somewhere other than the keyboard this routine must be called before using CHRIN or the GETIN routines. Should you be using the keyboard then the calls to this and the OPEN routine are not required.

CHKOUT

Purpose: Open a channel for output
Call address: $FFC9
Input parameter: X

Similar to the above routine, however, this time the OPEN file is set up for output. This routine is used before outputing data to any device, unless it is the screen.

CHRIN

Purpose: Get a character from the input channel.
Call address: $FFCF
Output parameter: A
Machines: All

This routine gets a byte of data from a channel already set up as the input routine by using the routine CHKIN. If CHKIN has not been used then all input is expected from the keyboard. The data is returned in the accumulator.

CHROUT

Purpose: Output a character
Call address: $FFD2
Input parameter: A
Machines: C16, Plus/4, C64, C128

This routine sends the character in the A register to the current output device. The output device must have been set up using the OPEN and CHKOUT routines. If these have not been used the data is sent top the screen.

CIOUT

Purpose: Send byte over serial bus
Call address: $FFA8
Input parameter: A
Machines: All

This is the routine used to send data over the serial bus. Before you use this routine the LISTEN routine must be used to tell a device to get ready to receive data. Should the device use a secondary address then you should use the SECOND routine to send this.

CINT

Purpose: Initialize video controller and screen editor
Call program: $FF81
Machines: All

This routine initialises the video chips and the Screen editor. On the C128 the function keys are set to their default values and the 40/80 key is checked to see which mode the video chip should be in.

CLALL

Purpose: Close all files
Call address: $FFE7
Machines: All

A call to this routine will close all open files. A CLRCHN routine is also executed to reset all I/O channels.

CLOSE

Purpose: Close a specified file
Call address: $FFC3
Input parameter: A
Machines: All

This routine is used to close a file after it is finished with. The accumulator should be loaded with the number-of the channel to be closed before calling this routine.

CLRCHN

Purpose: Clear I/O channels
Call address: $FFCC
Machines: All

Call this routine to clear all open channels and restore the Input/Output channels to their original default values. If any open channels are set up as serial then an UNTALK is sent first to clear the input channel or an UNLISTEN is sent to clear the output channel.

GETCONF

Purpose: Get the configuration byte.
Call address: $FF6B
Input parameter: X
Output parameter: A

A table at memory location $FF6B is required for normal operation of the C128. The configuration index should be passed in the X register. The configuration is returned in the A register.

DLCHR

Purpose: Copy the character ROM
Call address: $FF62
Machine: C128

A call to this routine causes the character set to be copied into the video display chips internal memory.

DMACALL

Purpose: Initialise external RAM components
Call address: $FF50
Input parameter: X
Machine: C128

When you require direct memory access to external memory it must first be initialised with this routine. The X register should contain the new configuration.

GETIN

Purpose: Get a character
Call address: $FFE4
Output: A
Machines: All

If the input channel is the keyboard then one character is read from the keyboard queue and its ASCII value placed in the A register. No characters in the buffer places a zero in the A reg. If the input channel is serial, cassette or screen then use the CHRIN routine.

INDCMP

Purpose: Compare the accumulator with memory in any bank
Call address: $FF7A
Input parameters: A, X, Y $02C8
Output parameters: $05

To compare the contents of the accumulator with the contents of a memory location in any bank you should put the configuration index in the X register and the offset in the Y register. Location $02C8 should hold the address of the zero page memory location that holds a pointer to the memory location that you wish to compare with.

INDFET

Purpose: Get a byte from any bank
Call address: $FF74
Input parameters: A, X, Y
Output parameter: A

This allows you to read the contents of an address in any configuration without having to change the actual memory configuration. A pointer must be defined in a zero page

location that points to the address to be read. The A register should contain this address. The configuration index is passed in the X register and the offset to the zero page pointer in the Y register. The result is returned in the A reg.

INDSTA

Purpose: Store accumulator in any bank
Call address: $FF77
Input parameters: A, X, Y, $02B9
Machine: C128

This routine will store the contents of the A register in any memory configuration. The A register should contain the character to be stored. The zero page address where a pointer to the memory address is stored must be placed in number and the Y register the offset from the location that is in zero page.

IOBASE

Purpose: Define I/O memory page
Call address: $FFF3
Output parameters: X, Y
Machines: All

This routine sets the X and Y registers to the address of the memory section where the memory mapped I/O devices reside. You can then use this address with relative addressing to access the different ports in the necessary devices. The X register contains the low byte of the address and the Y register the high byte.

This routine provides a certain amount of compatibility between Commodore machines. If you call this routine and use relative addressing to address the registers in the I/O chips.

IOINIT

Purpose: Initialise I/O devices
Call address: $FF84
Machines: All

This routine initialises all input/output devices and routines.

JMPFAR

Purpose: Jump to any bank
Call address: $FF71
Input parameters: zero page 2 to 9
Machine: C128

This routine enables a jump to another routine in any bank. Parameters are passed through memory locations 2 to 9.

JSRFAR

Purpose: Jump to a subroutine in any bank
Call address: $FF6E
Input parameters: Zero page 2 to 9
Output parameters: Zero page 2 to 9

This routine is used to jump to a subroutine in any bank. The parameters are passed in memory locations 2 to 9.

LISTEN

Purpose: Tell a device on the serial bus to listen
Call address: $FFB1
Input: A
Machines: All

This routine commands a device on the serial bus to get ready to receive data. The A register should be loaded with the device number before using this routine.

LKUPLA

Purpose: Search in table for logical file number
Call address: $FF59
Input parameter: A
Machine: C128

This routine searches in the table for the device and secondary address of the logical file specified in the A register. If the file is found then carry is cleared, A register contains the file number, X holds the device number and Y holds the secondary address.

LKUPSA

Purpose: Search for secondary address
Call Address: $FF5C
Input parameters: Y
Machine: C128

The specified secondary address (in the A reg) is searched for in the table of OPEN files. If the search success the carry is cleared and the A register will contain the File Number and the X register the device number.

LOAD

Purpose: Load from device
Call address: $FFD5
Input: A, X, Y
Machines: All

This routine LOADs data from the specified device. The Accumulator should be set to a zero if a LOAD is to take place or a one should you require a verify. If you OPEN the file with a secondary address of 0 the X and Y registers should contain the start address for the LOAD. If the secondary address is 1 then the data is LOADed into the area of memory that it was SAVEd from.

Before you use this routine you must have called the SETLFS and SETNAM routines.

MEMBOT

Purpose: Set bottom of memory
Call address: $FF9C
Input parameters: X, Y
Output parameters: X, Y
Machines: All

This is used to set the bottom of memory. The lower boundary of the available memory is set with the two registers X and Y. X is the low byte of the address and Y the high. If the carry flag is set when a call is made to this routine the memory bottom is read and returned in the X and Y registers.

MEMTOP

Purpose: Set the TOP of RAM
Call address: $FF99
Input parameters: X, Y (carry clear)
Output parameters: X, Y (carry set)
Machines: All

When the carry is set the top of memory address is returned in the X and Y registers. If carry is clear the top of memory is set to the address in the X and Y registers, X is the low byte and Y the low.

OPEN

Purpose: Open a logical file
Call address: $FFCO
Machines: All

This is the routine used to OPEN a logical file. Once the file is set up you can then use it for either input or output. The SETLFS and SETNAM routines must be called before using OPEN.

PFKEY

Purpose: Define a function key
Call address: $FF65
Input parameters: A, X, Y
Machine: C128

This is the routine to use if you are wanting to define a function key. The zero page address that points to the text for the key should be placed in the A register. The X programmed and the Y register should contain the length of the string.

PLOT

Purpose: Set cursor location
Call address: $FFFO
Input parameters: X, Y (carry clear)
Output parameters: X, Y (carry set)
Machines: All

A call to this routine with the carry set will return the position of the cursor on the screen in the X and Y registers. X holds the row number and Y holds the column. Calling this routine with the carry clear will move the cursor to the screen position specified in the X and Y registers.

PRIMM

Purpose: Print out a message
Call address: $FF7D
Machine: C128

All characters following this call are sent to the current output device until a zero byte is reached. The program then continues normally.

RAMTAS

Purpose: Perform RAM test
Call address: $FF87
Machines: All

This is the initialisation routine that sets up the zero page etc. of the machine. This is sometimes called a warm start.

RDTIM

Purpose: Read system clock
Call address: $FFDE
Output parameters: A, X, Y
Machines: All

This is used to read the system clock. Three bytes a returned by the routine. The A register contains the most significant byte, The X register contains the next most significant and the Y register the least significant.

READST

Purpose: Read Status word
Call address: $FFB7
Output parameter: A
Machines: All

This routine returns the status of the I/O devices in the A register. This routine should be called and the status checked after the I/O operation.

RESTOR

Purpose: Initialise the system vectors
Call address: $FF8A
Machines: All

This routine sets up the default values for all of the computer's system and interrupt vectors.

SAVE

Purpose: SAVE memory to a device
Call address: $FFD8
Input registers: A, X, Y
Machines: All

This is the routine to use if you wish to SAVE a section of memory. The device address, file name etc. must be set with the SETLFS and SETNAM routines. 128 owners must also set the bank with a call to SETBNK.

The zero page address at which the start address of the area to be SAVEd is stored must be placed in the A register. The end address of the area is placed in the X (low) and Y (high) registers.

SCNKEY

Purpose: Scan the keyboard

Call address: $FF9F
Machines: All

This routine scans the keyboard and checks for a keypress. This routine is called by the interrupt handler. If a key is pressed its ASCII value is placed in the keyboard queue.

SCREEN

Purpose: Return screen format.
Call address: $FFED
Machines: All (but see 128)
Output parameters: X, Y

This routine returns the format of the screen. On a C64 this would be 40 columns in the X register and 25 lines in the Y register. This routine can be used to determine what machine your program is working on.

128 owners should note that this routine will get the size of the current screen window. After the call the A register contains the maximum column number. The number of lines in the Y register and the X register contains the number of columns.

SECOND

Purpose: Send secondary address for LISTEN
Call address: $FF93
Input parameters: A
Machines: All

Use this routine when you wish to send a secondary address to an I/O device after issuing a LISTEN command. When sending a secondary address down the serial bus the address must first be ORed with $60.

SETBNK

Purpose: Define memory bank for disk operation.
Call address: $FF68
Input parameters: A, Y
Machine: C128

You should call this routine before performing a LOAD, SAVE, VERIFY and OPEN command. The configuration index of the filename should be placed in the Y register and the configuration index of the memory area to be processed should be in the accumulator.

SETLFS

Purpose: Set up a logical file
Call address: $FFBA
Input parameters: A, X, Y
Machines: All

Use this routine to set the logical file number, device address and secondary address. The file number is passed in the A register. The X register should contain the device number and the Y register the secondary address.

SETMSG

Purpose: Enable/Disable system messages
Call address: $FF90
Input parameter: A
Machines: All

This routine controls the printing of error and system messages. If bit 7 of the A register is set then error messages will be printed. If bit 6 of the A register is set then system messages will be printed.

SETNAM

Purpose: Set up file name
Call address: $FFBD
Input parameters: A, X, Y
Machines: All

This is the routine to use when you are setting up a file name for the OPEN, SAVE or LOAD kernal routines. The A register should contain the length of the file name. The X and Y registers should contain the address in memory where the name is stored. X is the low byte and Y the high. 128 owners must also use the SETBNK routine to specify the bank to be used.

SETTIM

Purpose: Set the system clock
Call address: $FFDB
Input parameters: A, X, Y
Machines: All

The internal 'jiffy' clock can be set by this routine. Before calling this routine the A register should contain the most significant byte, the X register should contain the next most significant and the Y the least.

SETMO

Purpose: Set the time out flag for the IEEE
Call address: $FFA2
Input parameter: A
Machines: All

This routine saves the value passed in the accumulator as the timeout flag for the IEEE routines. Bit 7 of the accumulator should be set to 1 for timeouts to be effective.

STOP

Purpose: Check if the STOP key is pressed
Call address: $FFE1
Output parameter: Zero flag
Machines: All

This routine checks to see if the STOP key has been pressed since the last IRQ call. If it has then the zero flag will be set. In addition the CLRCH routine will be called.

SWAPPER

Purpose: Switch between 40 and 80 columns
Call address: $FF5F
Machine: C128

A call to this routine will cause a toggle between 40 and 80 column modes of operation.

TALK

Purpose: Tell a device on the serial bus to talk
Call address: $FFB4
Input parameter: A
Machines: All

When you want a device on the serial bus to TAK you must call this routine with the device number in the A register.

TKSA

Purpose: Send a secondary to a device that is commanded to TALK
Call address: $FF96
Input parameter: A
Machines: All

This routine will transmit the secondary address contained in the A register to a TALK device.

UDTIM

Purpose: Update the system clock
Call address: $FFEA
Machines: All

This routine causes the system clock to be updated. It is normally updated by the interrupt every 1/60th of a second.

UNLSN

Purpose: Send an UNLISTEN command
Call address: $FFAE
Machines: All

A call to this routine will tell all devices on the serial bus that are listening to stop receiving data.

UNTLK

Purpose: Send an UNTALK command
Call address: $FFAB
Machines: All

A call to this routine will tell any devices that are set to TALK to stop transmitting data.

VECTOR

Purpose: Copy or reset the system vectors
Call address: $FF8D
Input parameters: X, Y (carry clear)
Output parameters: X, Y (carry set)
Machines: All

Calling this routine with the carry bit set stores the current contents of the RAM vectors in a list pointed to by the X and Y registers. Calling this routine with the carry bit clear causes the RAM vectors to be copied from the area pointed to by the X and Y registers.

In Bare Facts we are attempting to provide you with the necessary information to make writing machine code programs and transferring macine code program from one machine to another. If there are any specific areas that you would like us to consider for inclusion in this section of the magazine then please write to us at:

Bare Facts
Your Commodore
1 Golden Square
London W1R 3AB.

However we must stress that all we are asking for is particular subjects that you require information on. We can not endeavour to covert or write your programs for you.

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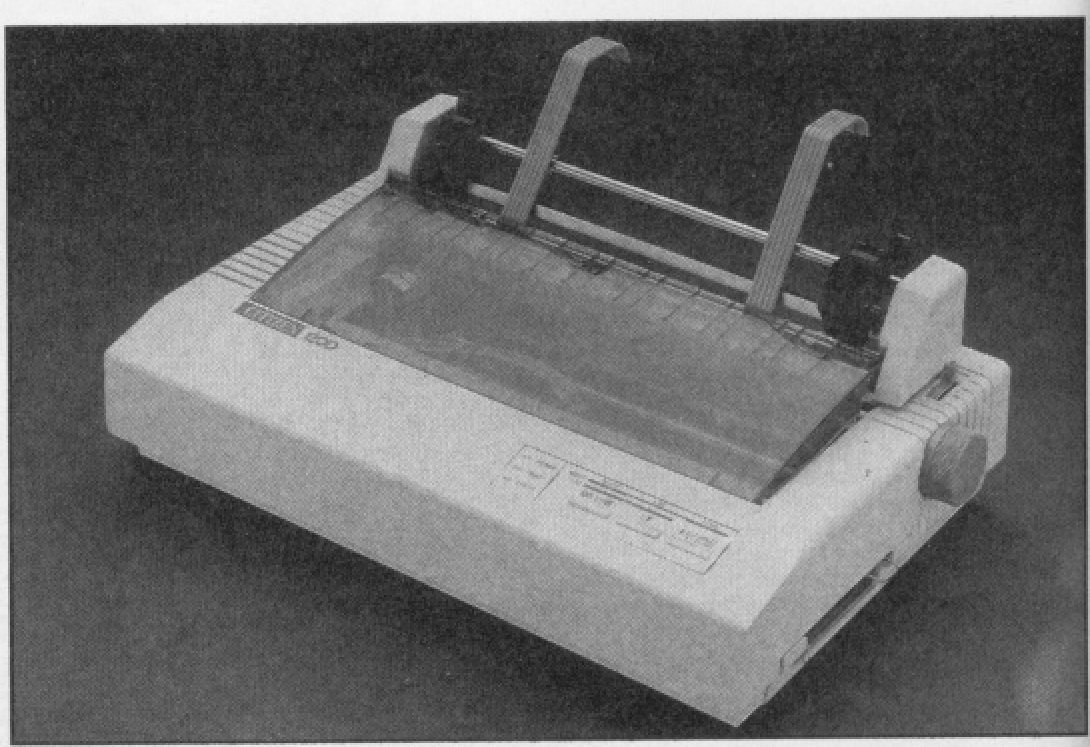
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B R E A K

Printer Winner



The winner of our December competition was Graeme Gibson, from Pity Me in Durham. He has won a Citizen *120D Dot Matrix Printer* worth £197 excluding VAT. A Commodore printer interface is also being included so that the printer is ready for immediate use. Congratulations Graeme!

Congratulations!

The first prize winner of the CRL Nu-Wave competition was Brian Osborn of Kirkintilloch who receives a superb package of a signed Tubular Bells album, a copy of the video and the computer program. The 29 runners up prizes of the program go to: D.J. Arnett, Swindon; Henry Topham, Silsden Keighley; W.H. Cox, West Lynn; Stephen Smith, Burnham; Mr F.G. Bullimore, Paignton; Ann Palmer, Stalham; C.M. England, Cheadle Hume; Tracy Roche, Poole; Mr R. Lucia, Harlow; Mark Winfield, Normal Hill; Julian Fagandini, Dulwich; J. Harper, Belfleet; Mr R. Gillings, Portsmouth; Andrew Fairbrother, Frinton-on-Sea; Ian Hallam, Havant; Peter Ovenden, Somerset; H.J. Bleumink, The Netherlands; D. Derrick, Cheddar; Ian Horn, Colchester; Mr J. Gubbins, Aldershot; Mr D. Taylor, Isle Of Wight; Maureen James, Durham; Michael Treacy, Co. Limerick; P.A. Hardy, Farnborough; Stephen Holliday, Chorley; Anthony Grist, Hove; Steve Skinner, Nottingham; Simon Thurman, Birmingham.

Oops!

In our February issue, there were some confusing line numbers in the *Word Pro Add On* article for the Plus/4. There was an assembly listing omitted from the article and although this is not necessary, when you want to type in and run the program, it may be quite useful to those of you who are interested in exactly how the program works. Therefore, if you want a copy of the listing, please send an s.a.e. to Word Pro Listing, *Your Commodore*, 1 Golden Square, London W1R 3AB.

Also in the February issue there is a stray characters in two lines of Adventure Aid Graphics (p.90). The line should actually read:

```
360 IFI$="\"THEN C3=C3+1: SYS SA
+6,C1,C2,C3:GOTO130
420 PRINTTAB(26)"[RVSON]4[RVSOFF
] : [YELLOW,SPOUND,WHITE]"
```

We apologise for any inconvenience which these slight errors may have caused to our readers.

Hex Data Entry

We have had a number of calls from people who are having problems getting the [REV H] and [REV SN] in line 30. These should appear in the listing as a reverse H character and a reverse shifted N. In the LISTINGS article we explain how to get a [REV T] character, follow the same procedure for these. It appears that a dot has disappeared in some copies of the magazine. Line 540 should have [LEFT3]. .[LEFT2] within the quotes.

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Assistant Editor: Marie Curry
Editorial Assistant: Stuart Kirkham
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